

Flight, March 16, 1916.

# FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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## Flight.

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## TO OUR READERS.

### The Supply of "FLIGHT." Important Notice.

Order "FLIGHT" to be either delivered or reserved for you regularly.

As the demand for "FLIGHT" is so great each week, it is of the utmost importance that readers should place their orders *firmly* for copies of "FLIGHT" at the bookstalls, their newsagents, or direct from the publishers, at 44, St. Martin's Lane, W.C., if they wish to secure a copy every week and avoid disappointment. The stringent Government restrictions in regard to the supply of printing paper necessitates this precaution in order that only actual numbers required are printed, and all wastage by unsold copies may thereby be reduced to a minimum, if not eliminated.

THE PUBLISHERS.

## EDITORIAL COMMENT.



EA verily, N. Pemberton-Billing, M.P., it is! In prophesying, in our issue of February 24th, that "P.-B." would join the Elect as a result of his entering the lists for the East Herts vacancy, we once more have rightly interpreted the voice of the people in regarding the mastery of the Air as of supreme importance for this country. The mandate to the Government, which the "Air" member takes with him, is of no uncertain character. In the majority of well

over a thousand the electors have spoken about as emphatically as it is possible to speak, and in the loss of this seat the Government have struck a pretty nasty "air pocket." If emphasis were needed to impress this fact, it is to be found in the almost super efforts to oppose the election of the Air Candidate, which were put into the work of the election by the entire organisation of both the Unionists and Liberals. That success failed to crown the opposition's very energetic tactics is a source of congratulation to Mr. Pemberton-Billing and for the future of Aviation, as we hope to see, by the enforcement of a strenuous policy, the opening up of a new era in offensive by our squadrons, so that the splendid raid achievements of our Flying Services in the earlier days of the war may be proved to have been no mere flash in the pan and the outcome of luck, but rather the natural outlet for the enterprise and pluck which is inborn in every man who has joined up with the Air Services of this Empire. That the absence recently of any military and naval raids upon massed lines has not been the fault of the individual units of the Services may be accepted. The men have been but waiting opportunities to let go at the enemy. But with restraining official influence at work, a state of lethargic despair has arisen, which is not conducive to maintaining the men in the highest state of active efficiency. It is to be hoped that these tactics will now be scrapped, and the flying officers given a really generous chance to take a hand in strafing the Hun in his lair. It may be but a coincidence, but already

since the Herts election result was announced, there has been a distinct revival in the activities of the air units at the front, where quite appreciable combined attacks have been carried out by the R.F.C., with what appear to be substantial results. We shall look forward to some similar tactics by the R.N.A.S. before long, and for these and other moves to utilise our air offensive in a spirit more in keeping with British ideas of aggression, we think the recent agitations, resulting in the very strong warning to the Government through the Herts election, can reasonably lay claim. Mr. Pemberton-Billing was to take his seat in the House of Commons on Tuesday of this week, introduced by Sir Henry Dalziel and Mr. Ronald M'Neill. Although the maiden speech of new M.P.'s is not expected, for various reasons, to be of an epoch-making character, in the case of "P.-B." a more than usually interesting result may be anticipated as his subject is a very definite one, and time being a very essential factor in the problem of supremacy in the air the public will look to the newly-elected representative of East Herts that no time is wasted in getting down to business. In congratulating Mr. Pemberton-Billing upon his plucky and successful fight against such heavy odds, we sincerely trust that now he has attained the object which, such a very short time ago, he set out to achieve, the atmosphere of the House will not act as a soporific upon his energies, but that we shall see his demand for attention to air supremacy so insisted upon, that even the Coalition Government cannot afford to delay, with platitudinous excuses, the time when they are prepared to recognise the mandate which exists in the country for a more defined and single-purpose air-policy. One thing ready to his hand for seeing that justice is done, is as to the treatment under present circumstances which is to be meted out to the highly valuable flying schools. Under the Military Service Act all sorts of complications may arise which, if allowed to go too far, may mean setting back in a serious degree the splendid work which these establishments have been and are doing. See to it, "P.-B.," without delay that such a disaster is not allowed to eventuate. Official minds are over slow to grasp a novel situation until it is too late.

In the  
Lords.

In the Upper House hitherto, the attention given to matters of the Air has not been as prominent as might have been expected, but on Thursday of last week any past slackness in this direction was more than compensated for in the quiet but

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## The New Air Committee.

MR. MACNAMARA, Secretary to the Admiralty, made the following announcement in the House of Commons on Tuesday :—

The Joint War Air Committee is constituted as follows : Chairman, the Earl of Derby ; Admiralty representatives, Rear-Admiral C. L. Vaughan Lee, Commodore Murray F. Sueter, C.B., and Squadron Commander W. Briggs, R.N. ; War Office representatives, Major-General Sir D.

masterly handling of this very vital subject by Lord Montagu of Beaulieu. His speech and statements of fact, by their very moderation, were much more convincing to his listeners than many of the verbose and drum-thumping campaigns in the other House. Neither noise nor abuse constitute argument, and by their avoidance Lord Montagu scored heavily. It was felt that sincerity guided his policy, and this attitude brought into sympathy with him many who might otherwise have resented what might be viewed as an aggressive attack upon the Coalition Government. We regard the Lords' debate of such importance in this much-discussed difference of opinion, as to the creation of an Air Ministry, that we reproduce the speeches of members and the Government's reply elsewhere in full. There are signs that the Ministry is beginning to recognise the necessity for acceding to the call for a Minister of the Air, and although it may cause in a measure an upheaval of working arrangements in certain directions, in the end we think it will be wise for the step to be taken sooner rather than later. That Lord Derby, with the continuous call upon his time and energies by the disentangling of the recruiting problem, can devote sufficient time to the air question, even in the limited sphere which has been defined for the Co-ordination Committee to work in, is open to very grave doubt. The restrictions upon the scope of the Committee are altogether too great and may possibly only lead to confusion worse confounded. It is better for the country that the Third Service should be created speedily, and we can see only minor difficulties—and those of a character that should never have had place given them—to be overcome for such a departure in our national affairs to work smoothly. "One Element, one Service" is a good slogan to have put forward, and now that Lord Montagu has placed his hand to the plough, and has more or less received public blessing and approval of his procedure from the men who matter, we shall hope to see a distinct move forward to the desired end. In that case the E. Herts vacancy will not have been contested in vain. In the words of the *Daily Telegraph*, which can hardly be classed amongst the hysterical press : "The hour has struck when the Government must recognise the importance of this question. They have hitherto treated aviation as 'a side show.' The problem of the air is something far different. . . . The command of the air may prove as essential to us as the command of the sea. We must be supreme in the upper element if we are to conserve our position afloat and give our armies a fair chance."

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Henderson, K.C.B., D.S.O., and Lieutenant-Colonel E. L. Ellington. Advisory members may be added as required. The secretariat consists of the secretary, Colonel Sir M. Hankey, and an assistant secretary, Major Storr, of the Committee of Imperial Defence.

The functions of the Committee generally are to deal with matters of policy from the point of view of construction and provision of material, for which a certificate as qualified pilot is not necessary.

# THE "AIR ELECTION."



**AN HISTORICAL EVENT.**—The declaration of the Poll at the Herts Town Hall, announcing the election, by 1,031 majority, of Mr. Pemberton-Billing, the first "air" candidate to be returned to the House of Commons.

THE result of the East Hertford election, as declared at Hertford on March 10th, was:—

N. Pemberton-Billing (Air) ... ..	4,590
Captain Brodie Henderson (Coalition)...	3,559
Majority ... ..	1,031

"My labours have finished here, and now my real work begins," said the successful candidate in proposing a vote of thanks to his helpers and supporters.

Capt. Henderson expressed the hope that his opponent would have strength and health to carry on his work.

At Bishop's Stortford Mr. Billing said that East Herts had sent a message to the world that England was awakening.

In the campaign Mr. Billing motored 1,460 miles in the constituency.

Captain Henderson, in thanking his friends, announced that he would live to fight another day.

According to the *Daily Telegraph*, 55 per cent. of the war work done at Captain Henderson's works is in the manufacture of aeroplanes.

## THE "X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of aircraft raids to be published, we are, as before, giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

The following announcement has been officially issued:—

### "X 22" Raid.

"War Office, March 8th.

"In addition to the casualties already announced, five persons

### Civilian Victims of Air Raids.

REPLYING to a question put in the House of Commons by Major Sir Charles Hunter, the Prime Minister has stated that the following non-combatants have been killed in air raids since the commencement of the war:—

Men.	Women.	Children.	Total.
127	92	57	276

### A Raider Chased Off.

ON Sunday, about mid-day, a German seaplane was sighted

previously reported as injured in the recent air raid have died, and fuller particulars of the number of persons injured are now available.

"The total casualties (all areas) are as follows:—

	Men.	Women.	Children.	Total.
Killed ...	9	4	5	18
Injured ...	22	22	8	52
	31	26	13	70

off the North Foreland making for the British coast. Aeroplanes went up from Dover, and the German turned tail and disappeared out to sea.

### Ireland and Air Raids

AT the deputation from Ireland to the Minister of Munitions last week regarding the utilisation of the resources of Ireland, Mr. John Redmond pointed out that with the development of aircraft a very serious danger was run in respect of firing factories, which would be lessened considerably if such a factory were built in Ireland.



# The British Air Service

"PER ARDUA AD ASTRA"

UNDER this heading are published each week the official announcements of appointments and promotions affecting the Royal Naval Air Service and the Royal Flying Corps (Military Wing) and Central Flying School. These notices are not duplicated. By way of instance, when an appointment to the Royal Naval Air Service is announced by the Admiralty it is published forthwith, but subsequently, when it appears in the LONDON GAZETTE, it is not repeated in this column.

## Royal Naval Air Service.

THE following appeared among the Admiralty announcements of the 7th inst. :-

Lieut. (R.N.V.R.) R. Leyland, appointed Acting Lieutenant-Commander, with seniority of March 4th. Sub-Lieuts. (Temporary) Lord Loughborough, H. A. R. Norton, D. A. B. Tonks, and J. Morrissey, all promoted to Lieutenants, with seniority of March 4th.

The following appeared among the Admiralty announcements of the 9th inst. :-

S. T. Hosken, entered as Probationary Flight Sub-Lieutenant (Temporary), with seniority of March 8th, and appointed to "President," additional, for R.N.A.S. Lieut. (R.N.R.) T. Godman, to "President," additional, for R.N.A.S. March 8th. Temporary Lieuts. (R.N.R.) J. H. English, J. N. Wilson, H. A. H. Seabrook and E. L. Johnston (both acting), all to "President," additional, for R.N.A.S. March 8th. Sub-Lieuts. (R.N.R.) W. H. Watt (acting), F. Cleary and F. Richardson (both temporary) all to "President," additional, for R.N.A.S. March 8th.

The following appeared among the Admiralty announcements of the 13th inst. :-

Surgeon (temporary) W. F. Jones to "President," additional, for R.N.A.S. To date March 11th.

A. E. Courage and H. E. Gillman, both entered as Temporary Sub-Lieutenants (R.N.V.R.), with seniority respectively of March 10th and March 11th, and appointed to "President," additional, for R.N.A.S.

## Royal Flying Corps (Military Wing).

The following appeared in the *London Gazette* of the 7th inst. :-

*Flight-Commanders (from Flying Officers).*—Feb. 20th, 1916: Maj. Robert A. Bradley, Prince of Wales's (North Staffordshire Regt.); Capt. Stephen C. W. Smith, East Surrey Regt., Special Reserve.

*Flying Officers.*—Feb. 22nd, 1916: Temporary Lieut. W. Astell, Lovat's Scouts, Yeomanry (T.F.); Second Lieut. D. S. C. Macaskie, Special Reserve; Second Lieut. William O. Russell, Special Reserve. Feb. 23rd, 1916: Second Lieut. John J. Breen, Royal Irish Regt., and to be seconded; Second Lieut. John B. F. Austin, 3rd (King's Own) Hussars, and to be seconded.

*Wing-Adjutants.*—Lieut. Dawyck M. V. Veitch, 1st Duke of York's Own Lancers (Skinner's Horse), Indian Army, vice Temporary Capt. C. F. Lee, West Somerset Yeomanry (T.F.), from Dec. 20th, 1915, to Feb. 24th, 1916. Capt. Gerald J. L. Stoney, Worcestershire Regt., and to be seconded; vice Lieut. D. M. V. Veitch, 1st Duke of York's Own Lancers (Skinner's Horse), Indian Army, Feb. 25th, 1916.

*Balloon Officers.*—Temporary Second Lieut. T. W. Nops, East Surrey Regt., and to be transferred to the General List; Feb. 10th, 1916. Feb. 24th, 1916: Lieut. Arthur L. Kent-Lemon, York and Lancaster Regt., and to be seconded; Temporary Second Lieut. W. R. Nelson, R.A., and to be transferred to the General List; Second Lieut. S. Gavin, 5th (Prince of Wales's) Batt., Devonshire Regt. (T.F.); Second Lieut. Merric W. Bovill, Special Reserve.

*Assistant Equipment Officers.*—Temporary Capt. H. P. R. Warren, Motor Machine Gun Service, and to be transferred to the General List; Jan. 18th, 1916. Second Lieut. Cyril R. Huggins, Special Reserve; Jan. 21st, 1916. Second Lieut. Keith D. Abercromby, Special Reserve; Feb. 22nd, 1916.

*Memorandum.*—Acting Corp. Henry G. P. Lowe, R.F.C., to be Temporary Second Lieutenant for duty with the Military Wing of that Corps; Feb. 10th, 1916.

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in their rank: Cyril R. Huggins, Keith D. Abercromby, Donald S. C. Macaskie and William O. Russell.

To be Second Lieutenants (on probation): Hywel L. Hughes; Feb. 8th, 1916. Edward L. P. Morgan; Feb. 15th, 1916. Archibald Livingstone-Allan; Feb. 17th, 1916. Kenneth C. Cleaver; Feb. 20th, 1916.

The following appeared in a supplement to the *London Gazette* issued on the 8th inst. :-

*To be Second Lieutenant for Service in the Field.* Gloucestershire Regiment.—Sergt.-Major George A. Hilliar, from R.F.C. Feb. 13th, 1916.

*Memorandum.*—Non-commissioned officers to be Temporary Second Lieutenants for duty with the R.F.C.: Corpl. A. L. Wilson, from 19th Alberta Dragoons, and Corpl. Henry Cockerell, from R.F.C.; Feb. 13th, 1916.

*Supplementary to Regular Corps.*—The surname of Second Lieut. (on probation) Chester Stairs Duffus is as now described, and not as in the *Gazette* of Dec. 23rd, 1915.

Second Lieutenants (on probation) confirmed in their rank: Alfred de Bath Brandon, Robert K. Muir and Chester S. Duffus.

To be Second Lieutenants (on probation): Stuart S. Kennedy; Jan. 26th, 1916. Basil M. Iles; Feb. 2nd, 1916. March 6th, 1916: Thomas Macleod, Sven E. Faber, Archibald J. McWha, David R. Stitt and Arthur P. Boney.

The following appeared in a supplement to the *London Gazette* issued on the 9th inst. :-

*Flight-Commander.*—Capt. F. M. Roxby, Prince of Wales's (North Staffordshire Regt.), Special Reserve, from a Balloon Officer, Feb. 20th, 1916.

*Flying Officers.*—Second Lieut. Patrick C. Campbell, Princess Louise's (Argyle and Sutherland Highlanders), Special Reserve, and to be seconded; Second Lieut. Guyon K. McDonald, Sherwood Foresters (Nottinghamshire and Derbyshire Regt.), Special Reserve and to be seconded; Second Lieuts., Special Reserve, Chester S. Duffus, Alfred de B. Brandon and Robert K. Muir; Feb. 24th, 1916.

*Supplementary to Regular Corps.*—Second Lieutenant (on probation) Vyvyan P. Spurway is confirmed in his rank.

To be Second Lieutenants (on probation): Joshua W. James and Henry R. Hawkins; March, 6th, 1916.

The following appeared in the *London Gazette* of the 10th inst. :-

*Supplementary to Regular Corps.*—John A. Coats to be Second Lieutenant (on probation); March 2nd, 1916.

The following appeared in a supplement to the *London Gazette* issued on the 11th inst. :-

*Supplementary to Regular Corps.*—Second Lieutenants (on probation) confirmed in their rank: Frederick N. Grimwade, Ernest Graham, James D. Latta and Merric W. Bovill.

The following appeared in a supplement to the *London Gazette* issued on the 13th inst. :-

*Assistant Equipment Officers.*—Second Lieut. George A. Hilliar, Gloucestershire Regt., and to be seconded; Feb. 13th, 1916. Temporary Second Lieut. C. H. E. Ridpath, General List, Feb. 26th, 1916. Second Lieut. S. G. Frost, Special Reserve; March 1st, 1916. Second Lieut. E. Graham, Special Reserve; March 2nd, 1916.

*Memorandum.*—Private John W. R. Elphinstone, from Inns of Court O.T.C., to be Temporary Second Lieutenant for duty with the Royal Flying Corps; March 13th, 1916.

*Supplementary to Regular Corps.*—Second Lieut. (on probation) Sydney G. Frost is confirmed in his rank.

To be Second Lieutenants (on probation): Leslie Bawn; Feb. 21st, 1916. March 13th, 1916: Cecil Kerr, Hubert F. Fisher.

## Two Fatal Accidents.

IT is with regret that we have to record two accidents on Saturday, which resulted in three lives being lost.

In one case, Capt. G. C. N. Nicholson and his mechanic, Jas. H. Martin, were flying a military machine which, at a height of 250 ft., side-slipped while banking and then dived to the ground. Both the pilot and mechanic died while being taken to hospital.

In the other accident, Second Lieut. R. Kilpatrick Muir was landing after a flight with his father, Mr. William Muir, when the

machine was caught by a gust of wind and crashed to the ground. Mr. Muir was thrown out and killed instantly, but his son escaped with slight injuries.

## The "Aeronautical Institute."

TWO more prominent names have disappeared from the executive committee of the "Aeronautical Institute," Sir George Greenhill, F.R.S., and Mr. Charles Bright, F.R.S.E., M.I.C.E., having followed the lead of Professor Bryan and requested that their names should be withdrawn.

# A "POPULAR" TYPE AEROPLANE DESIGN.

By C. M. POULSEN.

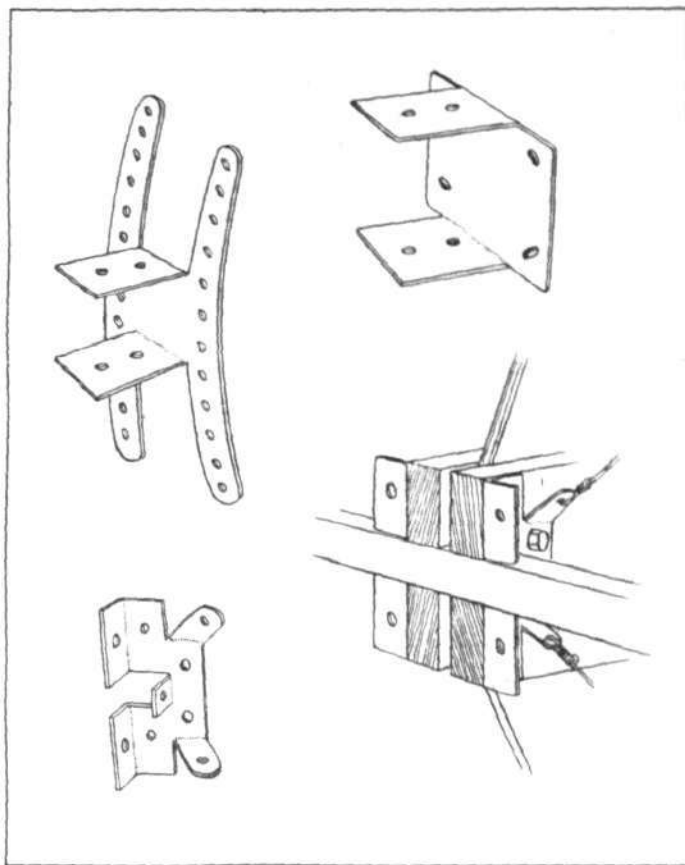
(Continued from page 195.)

HAVING decided on the general construction of the wings, the next problem to be considered is the construction of the tail planes. With regard to this, general practice differs considerably. Some designers prefer an all-steel construction, others part steel tubing and part wood, while others again confine themselves almost entirely to wood, with the exception, of course, of the necessary clips, &c. For a little, light machine like the one under consideration, and which is designed primarily with a view to ease of construction and low cost, the wood construction will probably be preferable.

In the accompanying illustrations an indication is given as to how the general construction of the tail planes may be carried out. Only one half of the fixed tail and one of the elevators has been shown, since the horizontal portion of the tail is symmetrical. In order to indicate the relative position of tail and body the latter has been shown in dotted lines. The fixed tail plane is, as will be seen, built up of ribs over two spars of "I" section. The spars are to be made of spruce, and a suitable size would, to my mind, be that shown in section on the large drawing. The section of front and rear spars could be made of the same section for the sake of cheapness, only the rear spar would, of course, have its deepest side facing forward. The ribs would be built up in a manner similar to those of the main planes, i.e., consisting of a web of  $\frac{1}{4}$  in. spruce with spruce flanges  $\frac{3}{16}$  in. by  $\frac{1}{2}$  in. In order to lighten the ribs their webs could be drilled out either in the manner shown or by oblong openings similar to those in the main plane ribs. The spars would be left solid at the root and tip like were the wing spars. For the leading and outer edges a rounded nose piece like that used in the wings might be used, or, what would be cheaper, strips of spruce of rectangular section measuring about  $1\frac{1}{4}$  in. by  $\frac{1}{4}$  in.

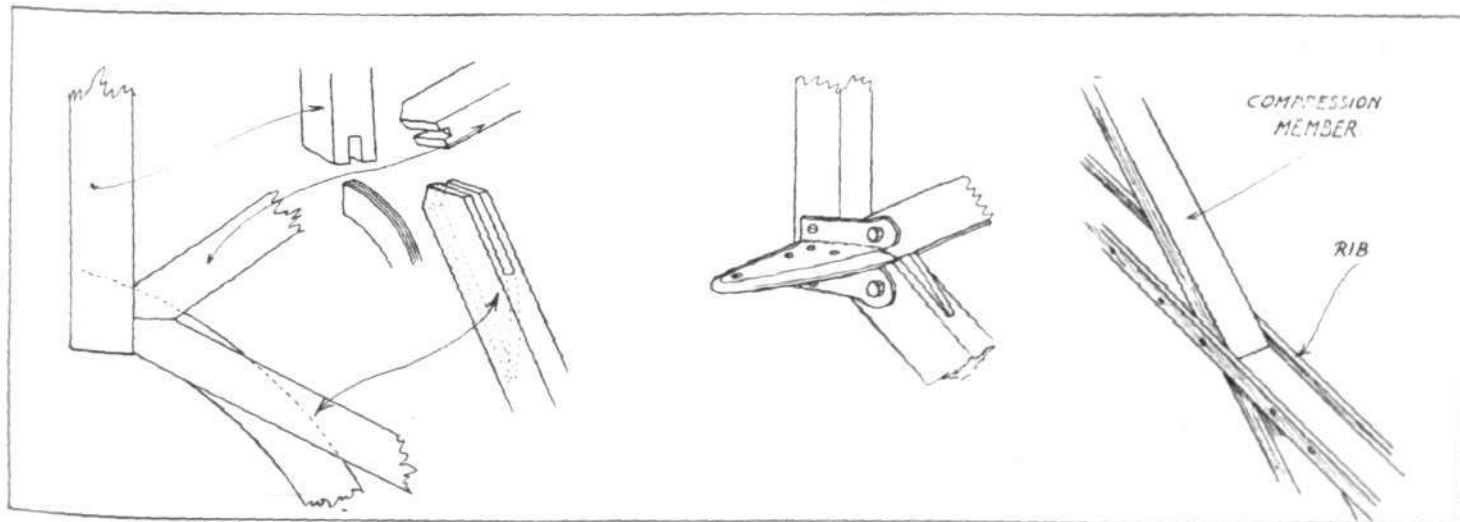
The elevators would have a leading edge similar to that employed in the *aileron*s and described in our last issue, and would be hinged in a similar way by means of eye bolts. For the trailing edge and ends of the elevators a thin strip of wood like that suggested for the tail plane would be used, the rounded corners being made of three-ply wood, of which a sufficient amount will have been

left over from the formers of the body. These short curved pieces of three-ply can be easily and strongly joined to the spruce strips by screwing and glueing. Internal cross bracing maintains the rigidity of the tail

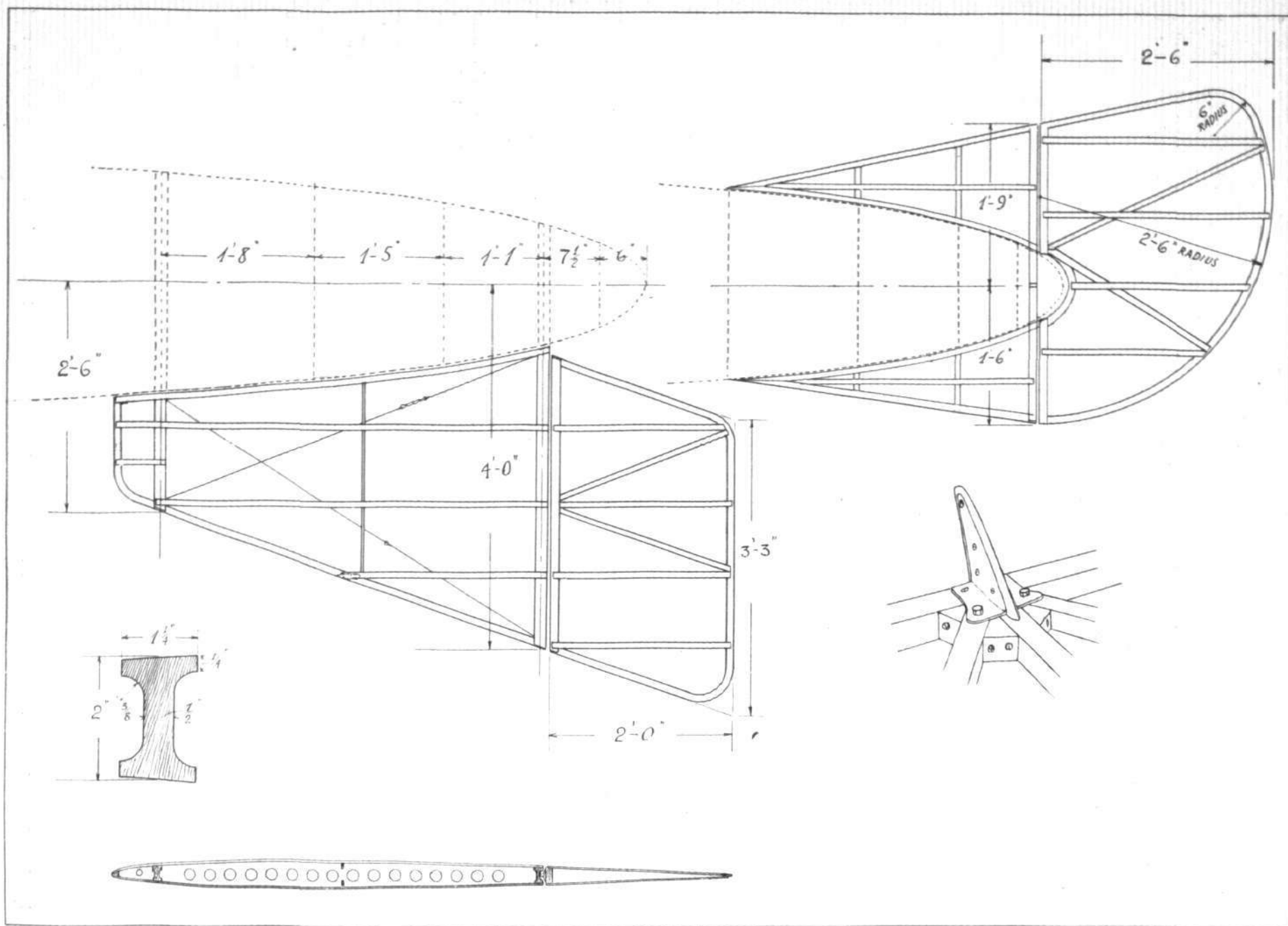


The fittings used for obtaining adjustment of the angle of incidence of the tail plane.

plane, the bracing wires being anchored to chain links secured to the spars of the tail planes by horizontal bolts. The two bolts securing the wiring plates to the rear edge of the tail plane could at the same time be used for the



SOME CONSTRUCTIONAL DETAILS.—On the left the joint between the leading edge of the rudder, the curved piece of three-ply wood that surrounds the tail piece of the fuselage, and the diagonal compression ribs of the rudder. In the centre the rudder crank lever, and on the right the method of fitting the longitudinal rudder ribs round the diagonal compression ribs.



GENERAL ARRANGEMENT OF TAIL PLANES, FINS AND RUDDER.—Inset: Perspective sketch of the elevator crank lever.



inner and outer hinges of the elevators. Inset in the large illustration is a perspective sketch showing a suggested method of attaching the elevator crank lever to the leading edge and diagonal stiffening ribs. Let into the sides of the flat crank lever are thin steel plates bent outwards at the bottom and secured to the leading edge by screws and to the ribs by small bolts passing through the ribs, which are here solid.

Since in an experimental machine one can never be absolutely certain of perfect balance longitudinally, it will be advisable to secure the tail plane to the body in such a manner that its angle of incidence may be altered. To do this slightly increases the difficulties of attachment, but the advantage of being able to adjust the angle of the tail makes the extra trouble well worth while. In one of the accompanying illustrations are shown the plates used for this purpose. A short, divided spar—divided in order to fit it in right across the body—runs from the outer edge of one middle *longeron* to the outer edge of the corresponding one on the other side. This spar is divided near its ends to accommodate the three-ply former. Screwed to this spar are wiring plates of the shape shown in one of the sketches. This plate, it will be seen, has its inner portion shaped like the ordinary *fuselage* wiring plates, while its outer part serves as an anchorage for the inner end of the tail plane spars. On the inner end of the front spar of the tail plane is a plate having two vertical strips running upwards and two running downwards, while in the centre the other parts of the plate are bent inwards to fit over the root of the spar, to which it is secured by screws. The vertical strips, it will be understood, will have to be slightly curved, but not so much as shown in the sketch, which was drawn exaggerated in order to emphasise this point. The curve, in fact, would be struck with the centre of the rear spar as a centre and the distance between front and rear spars—4 ft. 2 ins.—as a radius. Four short bolts secure the two plates in any desired position, ranging—according to the length of the vertical strips—from about two degrees positive angle of incidence to about two degrees negative angle. This should be ample for covering the useful range of angles of the tail plane.

On account of the variable angle the rear spar of the tail plane will have to be capable of being rotated, although only to a very small extent on account of the

distance it is from the front spar. The wiring plate and anchorage for the spar can be made the same as for the front spar, but for the plate on the root of the rear spar one shaped as shown in the sketch in the top right-hand corner is suggested. The four bolt holes corresponding to those of the body plate are slightly elongated, so that when the bolts are loosened the spar plate can be slightly twisted in either direction. When the front clips have been bolted up in the new position the bolts of the rear spar are again tightened up. This fitting, while not being strong enough to support an overhanging spar, will be quite good enough if bracing wires are taken from points some distance from the end of the spars to the top and bottom fins respectively.

The next thing to be considered is the rudder and the vertical fins. The latter, which consist of a light framework similar to that of the horizontal tail, are secured at the rear to a divided rudder post of rectangular section ash fitting into an opening cut in the wooden tail piece, in the centre of which the two halves of the rudder post meet, abutting against one another. The bracing wires running to the rear spar of the tail plane will prevent the rudder post from slipping out of the tail piece.

The rudder itself consists of a leading edge similar to that of the elevators and of a curved trailing edge, connected to the former by ribs and diagonal compression members. Again the three-ply wood left over from the *fuselage* formers will come in useful for the curved trailing edge of the rudder. On account of the small size of these formers the trailing edge of the rudder will probably have to be made up of several pieces, but this is no great disadvantage as a very strong joint can be formed by screwing and glueing. The hinge between the leading edge of the rudder and the fin posts is formed by means of eye bolts. Where the tail piece of the body projects behind the rudder post a short piece of three-ply is used, which is, of course, shaped to clear the tail piece by a safe margin. The method of attaching this curved piece of three-ply is shown in one of the smaller illustrations, which is, I think, self-explanatory. In the same set of sketches is shown the rudder crank lever, which is very similar to that of the elevators, and also how the diagonal compression ribs pass through the longitudinal ribs of the rudder.

(To be continued.)

### The Roll of Honour.

The following casualties in the Expeditionary Force have been reported from General Headquarters to the War Office:—

Under date March 1st:

#### Missing.

Second Lieutenant H. F. Champion, Rifle Brigade, 6th Batt., attached R.F.C.

Second Lieutenant L. A. Newbold, Essex Regt. and R.F.C.

#### Died of Wounds.

2nd Class Air-Mechanic T. F. Wells, Royal Flying Corps.

#### Previously reported Wounded, now reported

#### Died of Wounds.

2nd Class Air-Mechanic H. H. Scruby, Royal Flying Corps.

Under date March 3rd:

#### Missing.

Lieutenant H. F. Birdwood, 20th London (T.F.), Blackheath and Woolwich, attached R.F.C.

Lieutenant C. W. Palmer, Royal Flying Corps.

Under date March 4th:

#### Killed.

Second Lieutenant T. D. O'Brien, 16th Lancers, attached R.F.C.

#### Wounded.

Second Lieutenant R. A. Pierpont, Royal Berkshire Regt. and R.F.C.



Under date March 6th:

#### Killed.

Second Lieutenant H. A. Johnston, Royal Flying Corps.

#### Wounded.

Second Lieutenant L. C. Godwin, Royal Flying Corps.

Second Lieutenant C. N. Seedhouse, General List and R.F.C.

Under various dates:

#### Wounded.

Lieutenant C. I. Burrell, R.E., 1st (Newcastle) Northumbrian Field Co. (T.F.) and R.F.C.

Lieutenant A. H. Dickinson, N. Cyclist Bn. (T.F.) and R.F.C.

Second Lieutenant C. E. H. James, Welsh Regt. and R.F.C.

The following casualties have been reported from Mesopotamia:—

#### Killed.

Second Lieutenant R. H. Peck, Royal Flying Corps.

#### Missing, believed Killed.

Captain W. G. Palmer, 113th Inf., attached R.F.C.

A correction in the list of casualties in the Indian Expeditionary Force states that:

Lieutenant E. C. Braddyll, 10th Lancers, attached R.F.C., previously reported Died as Prisoner of War, should read "Officially reported Died."

# EDDIES

It was quite like old times up at Hendon the other day, when, on hearing the hum of a Gnome, I looked up and saw gliding along majestically one of the old type Short pushers with the little funny front elevator that suggests that it has only been put there to give the pilot something to look at, being not much larger than the invitation cards sported by some *nouveaux riches*. If I am not greatly mistaken the last time I saw one of these 'buses up Hendon way was away back before the war, when, one windy day, Gordon Bell arrived from Eastchurch and, leaving the machine at rest by No. 1 pilon, adjourned to the pavilion for tea. During his absence the wind got under the wings of the lightly loaded Short and started it up for a brief "joy ride" on its own, from which it ended by landing on its back.

x x x

However, the illusion did not last long, for presently the hum—or should it be hums—of two Anzani engines was heard, and one of the twin-motored Caudrons sped across the ground amid a spray of water with a distinctly muddy appearance, hopped off the ground and was soon lost to view in the distance. Starting off from a ground in a state like that in which Hendon finds itself at present is no mean test for a hefty machine like the twin-engine Caudron. Although the tracks made by the wheels were inches deep for the first part of the run until the wings began to take part of the load, the Caudron did not appear to experience any difficulty in getting away. The run along the ground was, perhaps, a little longer than usual, that was all. But then it should be stated that the man at the wheel was René Desoutter, who is a past master in the art of handling these particular planes.

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While on my way back from the aerodrome I passed by the old Caudron works at Hendon, and although a sign over the gates proclaimed to everybody interested

that the premises were to let, my ear caught the familiar sound of saws cutting their way through wooden planks. On information bent, I ventured inside, and there found Mr. E. Baumann, who was hard at work erecting a school 'bus, which looked as if it was practically ready to go down to the aerodrome and commence its career at the Ruffy-Baumann school. So it came about that I learnt who had taken over the one-time Caudron works. In the future all the "R.-B." wood work as well as erecting will be done there, while the various metal fittings will for the present still be made at Kendall Mews. The premises, although being of a rather disconnected character, provide quite a lot of room for construction, so that the making of spare parts as well as finished machines should progress at a very satisfactory rate.

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Mr. Sykes, one of the instructors at the L. and P. school, had a somewhat unpleasant experience the other day when out for a spin in rather gusty weather. He had just turned down wind somewhere in the neighbourhood of the Hall sheds when his propeller got impatient and left the machine behind, persuading quite a fair number of the internal parts of the engine to keep it company. This dissolution of a working arrangement was accompanied by much noise, and at first Sykes did not know what had happened. He looked around to see, as he put it, "Whether his tail was still following him," and having satisfied himself on this point he got her nose down and made a beautiful landing, although, according to the onlookers, coming down wind at a rate that was reminiscent of a de Havilland scout. As a test of a pilot's nerve the incident was not without value, and Sykes says that he does not in the least regret the experience.

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Welding is a job that requires such care and skill if the result is to be satisfactory, that one would not imagine



**BROOKLANDS AERODROME UNDER SNOW.**—During the recent deluge of winter snow, plenty of exercise has been available during the luncheon interval by friendly contest between the mechanics who are putting in such a strenuous time in the various works there. A couple of snaps above, by Mr. R. N. Stephenson, give an idea of the general *melée* in operation.



that it was a "line" particularly suitable for women war workers. Yet I understand that some experiments carried out at the works of aircraft manufacturers have proved highly successful, and that for the lighter classes of work the women welders are showing themselves quite equal to the task.

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Matters are apparently improving with regard to our countering daylight seaplane raiders. In previous reports of incidents of this character the official reference usually has run something like this: "A hostile seaplane dropped bombs on such and such a town. Our machines went up in pursuit but failed to overtake the raider. The damage, &c." This time it seems that our aviators actually succeeded in heading off the raider before he had a chance to drop his visiting cards. We shall yet live to be officially informed that our aviators gave chase and brought down the enemy. Just wait and see.

x x x

Of the newer French machines one that has been very successful of late is the little Ponnier single seater scout. This firm has, it will be remembered, had considerable experience in building fast machines, the little monoplane built for the last Gordon Bennett race and flown by Emile Vedrines actually being faster than the winning Deperdussin monoplane flown by Prevost. Shortly before the outbreak of war the Ponnier firm brought out a little fast scouting biplane, which was fully illustrated and described in "FLIGHT" of August 14th, 1914. The new machine, while retaining many of the characteristics of the 1914 type, has benefited from the lessons learned during actual war service and incorporates many improvements. Most noticeable of these is a better streamline body which has increased the speed of the Ponnier to something far above that obtained with the older type. When seeing and hearing daily of the important rôle played by the fast single seater scouts in the aerial warfare one first begins to realise what a debt of gratitude the aviation industry, and the whole world for that matter, owes the Sopwith Aviation Co. for being the first to demonstrate the capabilities of a short span, high-powered single seater tractor biplane.

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When down Chelsea way the other day I paid a visit to the works of the Wells Aviation Co. They are busy almost unto monotony down there, and it was a revelation to see the changes wrought since my first visit to those works, which were then dubbed the Coldrum Pottery. However, that is another story. What I was

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#### Gallant Work by the R.F.C.

A SUPPLEMENT to the *London Gazette* issued on Saturday gives the following details of the work for which the undermentioned non-commissioned officers and man of the Royal Flying Corps were awarded the Distinguished Service Medal as recorded in "FLIGHT" for January 20th, 1916:—

2085 1st Class Air-Mechanic F. HARTLEY, Royal Flying Corps.

For conspicuous gallantry on fifteen occasions while employed as a gunner in an aeroplane, and on two occasions he exhibited great courage and skill in aerial combat.

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#### New Passenger Records by Verrier.

THAT old Hendon favourite, Pierre Verrier, who, it will be remembered, was wounded over a year ago and is now putting in good work testing new machines in France, apparently finds time

going to say was that I was told that one of the Benoist twin-engined flying boats, for which Mr. Wells holds the agency, is expected over here very shortly. These boats differ so considerably from usual practice in many respects that the trials of the first to visit these shores will be awaited with interest.

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So, as we of "FLIGHT" anticipated, "P.-B." is now "M.P.," and right well he deserves it. And now it's up to him to make aviation matters hustle at Westminster like unto the manner in which he pushes along his own concerns. Here is a typical illustration of the determination and resourcefulness that characterises "P.-B." The incident dates back to the time when, about a week before an Olympia Aero Show, he had hardly completed the hull of his first supermarine, and yet, when I expressed surprise, assured me with perfect confidence she would be ready for the show. It seemed to me incredible that she could possibly be finished in time, but you see that was before I knew "P.-B." As a matter of fact P.-B. was ready, as "FLIGHT" readers will remember. Even before the show 'bus was finished the drawings for a new and improved type were already being prepared. The chief characteristic of this machine was that on terminating a flight the wings could, if desired, be left behind and the pilot proceed in the hull, motor boat fashion.

x x x

Although the war stopped further experiments along these lines there can be little doubt that at some future date the idea will be developed, for it has, undoubtedly, considerable advantages. Shortly before the outbreak of war, yet a different type of machine issued from the works at Southampton. This time it was a little single-seater scout, which was, it may be remembered, designed, built and flown within a week. Another proof of "P.-B.'s" characteristic "push and go" methods. Of his activities since the outbreak of war nothing may be said at present, but a time back reference was made in these columns to a little single-seater pusher scout, fondly nicknamed the "sparklet," which showed her paces at Hendon. Power for power she was probably the fastest pusher in the world. Since then other things have happened, but all through the predominant feature in "P.-B.'s" activity has been his ability to get things done and get them done quickly. It is to be hoped that this capability will stand him in good stead in the difficult task that awaits him in the House of Commons.

**ÆOLUS.**

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1689 Corporal E. P. ROBERTS, Royal Flying Corps.

For conspicuous good work as an observer. In September, when certain photographs were urgently required, and the clouds were very low, he took the photographs under a heavy fire.

235 Sergeant A. SCOTT, Royal Flying Corps.

For conspicuous devotion to duty and resource. Throughout the campaign he has always exhibited great technical ability and untiring energy, and has been in no small measure responsible for the efficiency of the plans sent out to squadrons.

3038 Sergeant F. V. WRIGHT, Royal Flying Corps.

For conspicuous devotion, great initiative and energy, and thoroughly good and valuable work throughout the campaign.

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to improve some of the records. According to the *Petit Journal*, in a recent six hours' flight with passengers at Etampes, he made four records, three of which are said to have been approved by the A.C.F. He took four passengers up to 11,028 ft. in twenty-eight minutes, only the cold preventing him going higher.

# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## Annual General Meeting.

THE Annual General Meeting of the Members of the Royal Aero Club of the United Kingdom will be held on Tuesday, March 28th, 1916, at 166, Piccadilly, London, W.

## Committee Election.

The following Members have been nominated:—

Lieut.-Col. R. K. Bagnall-Wild, R.E.  
Lieut.-Col. W. D. Beatty, R.E.  
G. B. Cockburn.  
Lieut.-Col. F. Lindsay Lloyd.  
Capt. J. T. C. Moore-Brabazon, R.F.C.  
Com. C. R. Samson, R.N., D.S.O.  
A. Mortimer Singer.  
T. O. M. Sopwith.  
The Marquess of Tullibardine, M.V.O., D.S.O., M.P.

The number of candidates not exceeding the number of vacancies, no ballot paper will be sent to the Members.

## Extension of the Hours of Opening the Club.

The Club is now open from 9 a.m. to 10.30 p.m. each day, including Sunday.

## THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers, and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 166, Piccadilly, London, W.

Subscriptions.	£	s.	d.
Total subscriptions received to March 7th, 1916	10,578	13	10
Staff and Workers of Gwynnes, Ltd. (Eleventh contribution) ... ..	10	7	10
Employees of Ruston, Proctor, and Co., Ltd. (Seventh contribution) ... ..	1	10	0
Collected at the Westland Aircraft Works, Yeovil (Twenty-fourth contribution) ... ..	0	8	1
Total, March 14th, 1916 ... ..	10,590	19	9

166, Piccadilly, W. B. STEVENSON, Assistant Secretary.

## FROM THE BRITISH FLYING GROUNDS.

### London Aerodrome, Collindale Avenue, Hendon.

**Grahame-White School (R.N.A.S.).**—Straights with instructor last week: Probationary Flight Sub-Lieuts. Donald, Griffin, McHardy and Melhado. Circuits and eights with instructor: Probationary Flight Sub-Lieuts. Gibbs, How, Powles, West and Wigglesworth. *Brevet* test A: Probationary Flight Sub-Lieut. Carr.

*Brevet* during week: Probationary Flight Sub-Lieut. Kingsford.

**Grahame-White Civilian School.**—Straights with instructor: Messrs. Baragar, Hillaby, Holman, Scheidt, Sloden, Spencer, Williams F., Williams S., Hathaway, Nadin, Rigby and Sandys. Circuits and landings with instructor: Messrs. Kryn, Phillipi, Walk, Eichelbrenner and Leigh. Eights with instructor: Mons. Grasset.

Instructors during week: Messrs. Biard, Hale, Manton, Pashley, Russell and Winter.

**Beatty School.**—The following pupils were out during last week: Messrs. Brand, Collier, Edwards, Samter, Monhom, Chang, Martin, Hungwan, Tjaarda, Branford, Patterson, Podmore, Yam, Tzesing and Ching.

The instructors were Messrs. G. W. Beatty, W. Roche-Kelly, G. Virgilio, R. W. Kenworthy, L. L. King, A. E. Mitchell and H. Fawcett, the machines in use being Beatty-Wright dual-control and single-seater propeller biplanes and Caudron dual-control and single-seater tractor biplanes.

**Hall School.**—The following pupils were out receiving instruction during last week:—With C. M. Hill: Messrs. Warwick, Osmond, Lieut. Cooke, Taylor, Rand and Smith. With J. Drew: Lieut. Cooke, Ormerod, Wooley and Arnsby. With A. Chave: Messrs. Mahoney,

Halliday, Gudger, Taylor, Collier, and Rayne. The following were doing rolling practice: Messrs. Smith (2), Rochford, Neal, Roberts and Millburn.

Machines in use: Hall and Caudron Government type tractors.

**London and Provincial Aviation Co.**—Pupils doing rolling last week: Messrs. Archer and Pulford. Doing straights: Messrs. W. Hay and C. M. Clement.

Instructors: Messrs. W. T. Warren, M. G. Smiles, H. Sykes, C. M. Jacques and W. T. Warren, jun.

Owing to most unfavourable weather, there has been very little flying practice this week.

**Ruffy-Baumann School.**—Pupils with instructor last week: Messrs. Winter, Cox, Bolton, Laidlaw, Dobson, Wood, Westlake and Cuthbertson. Straights and circuits alone: Messrs. Laidlaw and Cuthbertson.

Instructors: Messrs. Ed. Baumann, Felix Ruffy, Ami Baumann and Clarence Winchester.

Machines in use: 50 and 60 h.p. Ruffy-Baumann tractor biplanes.

### Bournemouth School.

PUPILS doing rolling last week: Messrs. G. Mouton, O. Wilson, Morris and Adamson. Doing straights: Messrs. H. Smith, J. Wilson, Morley and W. Mouton. Half circuits alone: Messrs. Bonnevie, Simpson, Dubois, Devos and Meeus.

Instructors: Messrs. F. King, J. G. Woodley and S. Summerfield.

35 h.p., 45 h.p. and 60 h.p. Caudron type in use.

During the week Messrs. F. King and S. Summerfield gave several exhibition flights on the 45 h.p. and 60 h.p. Caudrons.





BEFORE the war I could safely avow that I detested new clothes, aviation or otherwise. Even though I knew I was pleased and proud, as any boy in his first pair of all-the-way-downs, to have them on. For it is a way with men to proclaim abhorrence of new clothes, knowing that all other men will gather round in deepest sympathy and say "So do I."

Some will even go so far as to affirm that they would rather have a tooth drawn than go to their tailor, which expression is a plagiarism from the early days of photography. Then one's head had to be fixed in a vice in order to keep the smile long enough in one position for the purpose on hand, which was somewhat akin to dental procedure. Even now these instruments of the inquisition may be found in some studios. Therefore the story of the little boy who could not understand how man could photograph an express train at full speed, and yet couldn't photograph a little chap like himself unless he were fixed up in clamps.

Of course I started out to talk about clothes, but the above story sets me wondering whether the little hero of this episode was the same whose proud mamma took to be portrayed, and who, having proved obdurate with regard to standing still, the poor operator suggested that if the mother would retire from the field of operations perhaps a result might be obtained. In less than a minute it was all over, and the picture secured. On the way home the fond mother asked: "And what did the kind gentleman say to Darling when Mummy had left the room?" The reply must have been highly illuminating. "He said," replied the fabrication of "Bubbles," "'Now then, Charles-the-First-Fauntleroy, if you don't stand still this time, be th'houly smoke I'll skin ye.'" That operator was not an Englishman, I feel sure. It's surprising how one gives away one's country of origin when one is mad, isn't it? But I started to talk about clothing, and only got pulled off the line for a moment owing to my sympathy with photographic operators, who I know from personal experience have more to put up with than most people imagine. Once I was assistant to the operator in a first-class West-end studio, when a lady brought in a bulldog to have his picture taken. This particular dog seemed to think his mission in life was to chew up everybody with the exception of his mistress, who kept him on a chain but did not want the chain to show in the photograph. Having got him hoisted up on to the top of a pedestal (by the lady, be it said), the operator, with a view to saving retouching in having that chain to work out of the negative, suggested that it should be removed for the moment. This was done, and the operator at the camera made a noise with his mouth like a cat, just to attract the dog's attention. He sprang at us from the pedestal, which went through the background, what time we sprinted for the darkroom. I was the nearer and got there first, slamming the door with the operator outside. Next moment I heard him above my head, on the top of the darkroom, and the speed at which he must have got there went far to proving to my mind that there was something in the

Darwinian theory of his ancestors.

I could tell you many funny stories about incidents happening to photographic operators, but it would not follow out my original intention to talk about clothing, although clothing itself is sometimes the starting-point of strange things, not devoid of humour, as the following will prove. I always had a love of horses, and when I got tired of Newmarket Heath, as explained last week, I took service in the Royal stables, and wore the scarlet and gold. My father, I believe, intended me for something different, something with more money in it and less adventure, but horses were my choice. I took service with the Duke of Edinburgh, and was the special attendant of his Duchess, the Grand Duchess Alexandra of Russia, then not long over from the land of snow. Near their estate at Eastwell Park, Kent, there was a cottage which had in the front garden a very fine mountain ash tree, full of berries. The Duchess wished to purchase these berries for the making of jam, which was I believe greatly thought of in her country, though not then much known here. During the conversation with the country dame, who was solicitous about the health of "Your good man," she said, "And this," meaning me, "is, I suppose, your son, Prince Alfred?" The Duchess explained kindly that I did not happen to be that exalted personage, when the dear old soul replied, "Oh, I thought he was, by his beautiful clothes."

How I do run on, to be sure, when I get yarning. What I meant to talk about when I sat down to write was the appointment of Major-General Sir David Henderson, K.C.B., D.S.O., Director-General of Military Aeronautics to the Army Council, and only intended to use clothes as an introduction in this way: Somebody once defined a gentleman as one who could put on his clothes and forget all about them.

To such an extent is this the case with some men that others fail to notice them also. It is a question, it seems to me, of personality. For instance, I have seen Major-General Henderson hundreds of times, and yet, when I heard of his appointment and tried to visionise him, I could not for the life of me remember whether I had seen him in uniform or mufti. Personality with the General is so evident, so all-embracing and absorbing, that for a moment one cannot see beyond it. As with looking at a bright light, it is not until we, as it were, shade our eyes in order to focus them on greater depth, that we observe the great things he has done for aeronautics. It is not until one thinks of all his good work so quietly and unobtrusively performed in the interests of our art since that day in August, 1911, when he obtained his pilot's certificate on a Bristol biplane at Brooklands, that one realises what it means to us, and the welfare of the country, to have such a one a member of the Army Council. We may rest assured that so far as it is within the possibilities of any one man to use his influence in guiding things into the desired direction, it will be done. And that there will be no mistake in the direction we may safely leave to his great grasp of facts and vast practical knowledge of matters aviatric.



# AIRSHIPS

By R. P. HEARNE.

LORD MONTAGU's excellent speech in the House of Lords last week should do much to arouse the Government to action in the matter of airships. And it is to be hoped that Lord Haldane's advice about "violent thinking" will be acted upon by the people who, years ago, should have been putting their minds to this problem.

It is rather pathetic that so many public men in this country should still regard the airship as something new which has been sprung upon us as a surprise. The Zeppelin has been before us for more than ten years. For even a longer period we have been tinkering with toy airships, varying the programme now and again by buying vessels from abroad—to save us from thinking out something new ourselves.

## The Results of Neglect.

The deplorable results of this neglect are very evident to-day. We have no school of airship design; we have very little data, and practically no experience; our theorists are at sixes and sevens; and our energy is frittered away in discussion. For my part I would prefer to have seen some action—even "violent action"—which would have given us crude types of airships that could be developed. It is better to make a start with a defective model, and peg away doggedly at improving it, than to dismiss the subject as useless after some thinking.

Lord Haldane was right to insist upon deep study of the problem, but coupled with that we must have practical experiment and full-scale constructional work. If the Government five years ago had said: "We want a fleet of British airships. Here are our requirements as to speed, load, range of action and climbing power, &c." Then it would have been possible to create in this country the necessary industry for building the ships. There would have been failures, but with that Government offer before us most certainly some of our designers and builders would have made good.

## Naval Airships.

Now we have Mr. Balfour referring regretfully to the lack of airships as naval scouts. The British Admiralty sees more clearly at this juncture that Germany scores an advantage in naval reconnaissance through her Zeppelins. But why was not this thought out years ago? It is not a new discovery that an airship at a height of 5,000 ft. has a range of visibility of ninety miles. If an airship can put to sea in company with a fleet, it can almost guarantee that no enemy fleet can outmanoeuvre the ships which it keeps watch for. The Zeppelin commands such a wide field of vision that surprise by an enemy fleet is well-nigh impossible.

Germany has been testing that work for years with her naval Zeppelins. Why have we not followed suit? The one reason is that we have not had rigid airships. The whole problem turns on the speed factor. Until Germany was able to evolve high-speed airships the sea-going airship scout was impossible. The non-rigid and semi-rigid airships have not the requisite speed for open sea work, and yet Mr. Balfour qualified his remarks on airships the other day by hinting that he did not necessarily mean rigid ships when he expressed the need for scout-craft.

## Slow Ships Useless.

Here is proof that the problem has not been fully thought out. The airship for open sea work must be of the Zeppelin type, for the simple reason that no other type of airship has the requisite speed. The slow ship is useless for the work. Over the sea the winds are usually strong, and unless an airship has a good margin of speed it cannot be usefully employed save in calm weather. Take the case of a semi-rigid or non-rigid ship with a maximum still air speed of 30 miles an hour. Put this craft against a twenty mile an hour sea breeze and the net speed of the ship is ten miles an hour. In practice it would be lower still, for the engines could not be maintained for a long period at their maximum power.

Now if this ship set out to escort a fleet, and if its speed dropped to, say, about eight miles an hour, owing to the persistent wind, the fleet would be compelled to slow down to the same speed, or else it would leave its scout far behind, and thus incur great danger. A change in the wind might hold up the 30 mile an hour ship completely, or drift it far out of its course. In short, the fleet would find this airship useless for the high-speed scouting essential in war.

It will be said that eventually non-rigid and semi-rigid ships can be made faster. But the reply to that is obvious. The naval Zeppelin of to-day is more than twice as speedy as the best of the other types of ships. Why struggle to make non-rigids and semi-rigids faster when an existing design of ship gives us the very feature which we require? The race for speed has been going on for many years, and the rigid has come out triumphant.

## Why the Rigid Ship is Superior.

The reasons for superiority in this respect are not far to seek. Both the non-rigid and semi-rigid ships are limited in size owing to constructional reasons. The non-rigid ship is like an inflated sausage skin. Its shape is maintained by gas pressure. It is essentially a small-size ship, and hence a low speed and short range ship. Properly employed it has its features of usefulness, but it can never equal a Zeppelin in speed or range of action.

The semi-rigid can be built to a larger size than the non-rigid, but here again we have an inflated and flexible skin called upon to bear the load to a considerable extent, and also the strains set up by high speed. In the rigid ship alone have we a stiff and unchangeable form of envelope. Instead of propelling an inflated sausage, or a sausage with a stiffened base, through the air we move a rigid body specially designed for high-speed work.

Of course the advantages of the rigid design must be paid for. I need not dwell on the many defects of the Zeppelin, for the British public have been kept well posted in this branch of the subject. But as speed is the essence of success in airship work of the more advanced forms, such as sea scouting and long distance raiding, it is evident that the 65 miles an hour Zeppelin stands well ahead of the other types of vessels whose maximum speeds are about 35 miles an hour. Improvements may come which will alter the comparison, for of course all airships are still crude.

## THE WEATHER ZEPPELINS HAVE COME IN.

A VERY illuminating analysis of the weather conditions on the occasions when Zeppelins have visited these shores, which has been compiled by a special correspondent of the *Daily Chronicle*, goes to disprove several ideas which have been put forward as to what Zeppelins can and can not do, and what weather conditions they can and can not operate in. The notes, which appeared in our contemporary on Saturday last, are as follows:—

"Many theories have been put forward about 'Zeppelin weather.' Among them there have been: (1) The moonlight theory; that Zeppelins do not come during the second and third quarters of the moon. (2) The temperature theory; that at low temperatures on the surface the high altitudes are too cold for them. (3) The wind theory; that a breeze that sets the dust flying and makes an umbrella difficult to manage, is too strong for them. (4) The wind direction theory; that certain winds hindered their passage across the North Sea. (5) The cloud theory; that in skies heavy with clouds they would be unable to see the land below and steer a course. (6) The fog theory; a stronger version of this last theory. (7) The rain theory. (8) The snow theory. (9) The barometer theory; that Zeppelins need be expected only when the aneroid

weather there has, of course, been every sort of variation of the barometer.

"The table below has been compiled with strict exactitude from official records, mainly supplied by the Meteorological Office. It states the conditions of temperature, wind, and weather, and the phase of the moon for every single Zeppelin raid, and for the districts raided.

"In this table the wind velocities are taken from the Beaufort scale, which is the meteorological standard. It will be observed that two raids took place in a strong breeze, 25–31 miles per hour; three raids in moderate breeze, 13–18 miles per hour; one raid in gentle breeze, 8–12 miles per hour; seven raids in slight breeze, 4–7 miles per hour; eight raids in light airs, 1–3 miles per hour. Similarly on three occasions the wind was S.S.W., two occasions S.W., four occasions N., three occasions E.S.E., three occasions S.E., three occasions N.E., one occasion S., one occasion E., and one occasion N.N.E. During these raids the temperature has varied from 34° to 68° Fahrenheit. On three occasions there was rain, on one occasion fog, on three occasions mist, on five occasions the sky was overcast, on three occasions the sky was three-parts

Date of Raid.	Place.	Temp. (Fah.).	Wind and Direction.	Velocity of Wind. Miles per hour.	Weather.	State of Moon.
1915.						
Jan. 19	Yarmouth ... ..	41	Light air, S.W.	1 to 3	Overcast sky; rain; mist	Four days after new moon
	Sheringham ... ..					
	King's Lynn ... ..					
April 14	Tyneside ... ..	45	Slight breeze, S.E.	4 to 7	Overcast sky; mist	New moon
" 15	Lowestoft ... ..	52	Slight breeze, S.W.	4 to 7	Sky three parts clouded	One day after new moon
	East Coast ... ..					
" 29	Ipswich ... ..	47	Slight breeze, N.E.	4 to 7	Blue sky; rain	Full moon
	Bury St. Edmunds ... ..					
May 10	Southend ... ..	52	Strong breeze, N.N.E.	25 to 31	Blue sky	Four days before new moon
" 16	Ramsgate ... ..	55	Light air, S.S.W.	1 to 3	Blue sky	Two days after new moon
" 27	Southend ... ..	48	Strong breeze, N.	25 to 31	Overcast sky	One day before full moon
" 31	Outer London ... ..	61	Light air, N.	1 to 3	Blue sky	Three days after full moon
June 4	East and South-East Coast	56	Slight breeze, E.S.E.	4 to 7	Clouded sky; mist	Last quarter
" 6	East Coast ... ..	55	Moderate breeze, S.E.	13 to 18	Blue sky	Two days after last quarter
" 15	North-East Coast ... ..	56	Slight breeze, N.E.	4 to 7	Sky half clouded	Three days after new moon
Aug. 9	East Coast ... ..	63	Light air, E.	1 to 3	Overcast sky	One day before new moon
" 12	East Coast ... ..	58	Light air, N.	1 to 3	Overcast sky; mist; rain	Two days after new moon
" 17	Eastern Counties ... ..	61	Slight breeze, N.E.	4 to 7	Sky three parts clouded	One day before first quarter
Sept. 7	Eastern Counties ... ..	62	Light air, S.S.W.	1 to 3	Sky half clouded	Two days before new moon
" 8	Eastern Counties and London	67	Slight breeze, E.S.E.	4 to 7	Sky three parts clouded	One day before new moon
" 11	East Coast ... ..	61	Mod. breeze, E.S.E.	13 to 18	Blue sky	Two days after new moon
" 12	East Coast ... ..	61	Gentle breeze, S.	8 to 12	Blue sky	Three days after new moon
Oct. 13	London and Eastern Counties	56	Light air, S.E.	1 to 3	Blue sky	Two days before first quarter
1916.						
Jan. 31	Norfolk, Suffolk, Lincs., Leicestershire, Derbyshire, Staffordshire	41	Light air, S.S.W.	1 to 3	Fog	Three days after last quarter
Mar. 5	Yorkshire, Lincs., Rutland, Huntingdonshire, Cambridgeshire, Norfolk, Essex, Kent	34	Moderate breeze, N.	13 to 18	Half clouded; snow squalls	Day after new moon

points to 'Set Fair.' Generally the assumption has been that Zeppelins are fair-weather craft, and dare venture forth only in light airs and on dark nights; that the moon is their most persistent enemy, putting them out of action for nearly a fortnight every month of the year; that even moderate winds were dangerous to them; and that snow would be fatal.

"Each and every one of these theories, as well as the underlying assumption, has been disproved by fact. There have been 21 Zeppelin raids up to date. The Zeppelins have come in virtually every phase of the moon, from new to full. In their successive visits they have had the wind from every quarter of the compass. The wind has ranged from 'light airs' to 'strong breezes.' The thermometer has ranged from frost to sweltering summer heat. Skies have been blue and overcast with clouds. There has been on several occasions mist; rain has been falling still more often; and during the raid of March 5th there was winter weather of an extreme kind; heavy snowfalls and squalls of wind. Bombs were dropped upon a northern town during snow squalls so bitter that the local correspondents spoke of a 'blizzard.' With all these varieties of

clouded, on three occasions the sky was half-clouded, on eight occasions the sky was blue, and on one occasion there were snow squalls. The great majority of the raids took place at or about new moon and in the first and last quarters of the moon. Yet three raids took place on moonlight nights, one (assumed on subsequent evidence to be a Zeppelin) at full moon, one the day before full moon, and one three days after full moon.

"Zeppelins, like every other craft not independent of the weather, prefer to sail forth in calms or light winds; yet, as the record shows, they are not afraid of moderately stiff weather that would make the skipper of a trawler anxious. They prefer darkness to moonlight because their large bulk makes them a conspicuous target; yet moonlight is not an absolute barrier. In short, there are very few things that one can safely prophesy about Zeppelin raids. The utmost one can say is, first, that the calmer the weather the likelier a raid is to occur; and, secondly, that raids are less likely to occur in broad moonlight than on dark nights. But the table given above shows that, of any weather short of gales and storms, it is impossible to say that it is not Zeppelin-weather."

### Boys Wanted for the R.N.A.S.

THERE are still vacancies in the Royal Naval Air Service for boy mechanics to be trained as wireless telegraphists. Age between 17 and 17½ in March, 1916. Pay 1s. per day up to the age of 18, at which age they are graded as 2nd Class Air Mechanics.

Service is for the period of the war only. There is no promise of permanent service.

Applications, giving full details of age, education, &c., should be made in writing, to the Wireless Officer, R.N.A.S. Depot, Barby Road, North Kensington. No boy need apply whose hearing or eyesight is in any way defective.



# DESIGNING AND BUILDING A BIPLANE.

THE STORY OF A SUCCESSFUL EXPERIMENT.

By ROBERT P. GRIMMER.

(Concluded from page 206.)

ON March 28th, Ding made two further flights of 15 minutes each, taking Mr. Mann as passenger in the second one. The chains jumped worse than ever, and two of Hans Renold's experts were absolutely horrified at their extraordinary behaviour. The speed was about 70 m.p.h., but the general performance was so short of Mr. Mann's expectation that it was decided to make very drastic alterations and to instal a 125 h.p. Anzani in place of the original 100 h.p. In the light of subsequent knowledge I regard the substitution of engines as a very great mistake, as it materially increased the loading and head resistance, and thus nullified the extra power. Later, I shall give a short list of the alterations, and point out the defects in the original machine, and the reasons that led to these defects. It is worthy of note that in this first Hendon period we only got in less than an hour's flying. On April 1st (of all days) we moved back to Surbiton with the "bus" and all our impedimenta.

Now, our troubles were two in number: (1) lack of rigidity in the transmission, chiefly in the diamond-shaped stays supporting the propeller shafts, of which stays the front pair were wires and the rear pair steel tubes, and (2) the excessive weight of the machine necessary to secure a high factor of safety in so experimental a "bus." The original machine with crew and fuel on board weighed over a ton, and the loading approximated to 9 lbs. to the square foot, but in spite of the manifest defects, its early performance of 70 m.p.h. speed and its 400-500 ft. per min. climb, put it in the very front ranks of "pushers." Had the transmission gear been as reliable as it afterwards became, there is very little doubt but that the machine would have been at once purchased by the Government, but the alterations occupied so long a period that by the time they were completed we had to face a rival in the shape of the twin-engined gun "bus," of which more anon. When the "steamroller" was dissembled after the flight of March 28th, it was discovered that the gearbox and its plate had been moving about and bashing the petrol tank, which would assuredly have burst had the flight, in which Mr. Mann went up as passenger, been prolonged a few more minutes. Furthermore, each radius rod had sheared through its bolt at the gearbox end, with the result that the chains had each been pulling to the extent of a thousand pounds or so against the wing spars. Owing to the jamming of the safety valve in one of the petrol tanks, not the one "strafed" by the gearbox, it was on the point of bursting with the volume of air pumped into it by our automatic pump and was distorted completely out of shape. By way of climax the chains had only kept on their sprockets by a miracle. A period of drastic alterations now commenced, including a new chassis, larger wheels, new propellers to absorb the increased power, a still larger rudder, more forward stagger, and the complete elimination of wires from the transmission. The new engine necessitated heavier shafts, sprockets, chains, radius rods, bridge pieces and gearbox. The difficulty in obtaining material was so great that it was not until the end of June that we saw Hendon again.

During part of our first visit to Hendon we had been housed in one of the L. and P. sheds, but we were soon moved from this to the large Navy shed. When we returned at the end of June, we were unable to get a shed of any kind either from the Navy or the Grahame-White Co., so we were compelled to import a tent, which was pitched near the Hall School. Ding made his sixth flight on Tuesday, June 29th, and the general show the "bus" put up was inferior to her March form, and necessitated further experiment with propellers to recover the lost speed and climb. The ill-luck that had haunted us in the spring was still in evidence, for a serious accident was only narrowly averted during Ding's seventh flight on July 3rd. The "steamroller" had been up several minutes at a height of 1,500 feet, and was on the point of landing *en vol plané*, when a pupil on a Caudron taxied right in front of him. With great presence of mind Ding switched the engine on again, and had it not picked up immediately the Caudron would have been smashed to matchwood by over a ton of "steamroller" moving through the air at 70 m.p.h. However, he was just able to jump over the "louse," the embryo pilot of which was in great need of a substantial dose of phosphorine. On Sunday, July 4th, Ding made his eighth and ninth flights, in the latter of which a very interesting episode occurred. The old "bus" was in great form and travelling at 73 m.p.h. Ding had just passed a "box-kite" to confute a rumour that the Mann was slower than machines of that type, and was banking to turn, when suddenly a shower of objects flew out behind the left rear of the machine and simultaneously everybody on the aerodrome heard a crashing report. At the same time the right-hand propeller was observed to increase its revolutions, but the "bank" grew no worse and Ding switched off, got the machine

at a level keel, and landed without accident. Investigations showed that one of the steel stay tubes supporting the left hand propeller shaft had broken, and falling back into the propeller, had caused it to disintegrate. This incident was really a blessing in disguise, for it demonstrated the utter fallacy of the theory that any accident to one of the propellers of a twin-propeller machine must inevitably "crash" the "bus."

A fortnight was spent in making a new propeller and strengthening up the propeller brackets, and on Sunday, July 18th, the "steamroller" was again pushed out. Jupiter Pluvius had been busy during that fortnight, and the whole machine had been saturated with water which had percolated through the roof of the tent. The result of all this soaking was a shocking attack of "non-starteris" on the part of the "starfish," which was not improved by the confusion of high tension wires 6 and 9 by a careless mechanic. The figures on the Anzani crank case, it transpired, were to be read upside down, which is somewhat embarrassing. M. Hagons, the Anzani expert, seemed greatly amused at our confusion of 6 and 9. During the following week short flights were made on July 19th, 20th and 21st, but trouble developed with both the petrol system and the air speed indicator, which restricted us to 10 minute flights at an alleged speed of 50 m.p.h. On the last day of July and August 1st some more or less "dud" flights were put up, and then Ding returned to Windermere in disgust, having flown the "bus" altogether about three hours.

Having in the meantime secured that *rara avis*, a petrol pump that pumps petrol, we induced Mr. Sydney Pickles to try the machine on August 4th. For once in a way the "steamroller" was on her best behaviour, and climbed without any forcing to 3,000 ft. in ten minutes, remaining in the air the record time for her of half an hour. On the following night, Thursday, August 5th, Pickles took up Mr. Mann as passenger for an hour's flight, climbing the first 5,000 feet in less than 20 minutes. After the transmission gear had been overhauled and found quite satisfactory, Pickles took up the writer on August 21st, and Mr. Jones, of "FLIGHT," on the same day. The climb had by this time been increased to 500 ft. per minute and the speed to 75-80 m.p.h. All our troubles seemed to be over, and the machine, now highly successful, was about to be re-offered to the Government when the thunderbolt fell. Pickles was forbidden by an American firm, with which he had just completed a contract, to fly any machine but their own particular make. The fatal day was August 22nd. Pickles had flown the "bus" almost as long as Ding, i.e., 3 hours.

A weary, discouraging wait ensued, for it was not until October 2nd that we were able to secure another pilot in the person of Mr. A. E. Barrs, invalided from the Royal Flying Corps. All the intervening six weeks the poor old "steamroller" was steadily deteriorating in our damp tent, the fabric getting slack and slack daily, and rust collecting on all the metal parts despite paint and grease. After two excellent preliminary flights of 18 minutes and 9 minutes respectively, during the second of which he carried a passenger, on the following day, October 3rd, he ascended with another passenger to the height of 5,000 ft., but as the weather was misty he decided to go no higher, and remained at that altitude for 40 minutes. After tea he took up a third passenger for 15 minutes and performed some astonishing evolutions, including heavily banked right and left-hand turns with hands off the controls, a feat that the exceptional stability of the Mann biplane renders quite easy. During all these flights the "steamroller" attained a speed of 80 m.p.h., which at that time was a record pace for a two-seated "pusher" machine, and surpassed by very few two-seater "tractors." Unfortunately, after landing and taxiing some distance, the wheels became embedded in a filled-in trench, with the result that the chassis and one propeller were broken. This, however, was in no way the fault of the machine. We had a lovely job getting the "bus" to our tent in the dark. To lift a dead weight of over a ton on to a trolley at night with only six pairs of hands and no mechanical appliances is "some" feat. Still, it was done with much pinching of fingers and uttering of strange oaths, and we "teedled" the trolley for home with one mechanic leading the way as guide and steering by the stars, a task for which his former experience in the Navy would seem to render him specially suitable. After we had been pushing and shoving for half an hour or so without any sign of the home fires in the tent, the ground seemed so very familiar that we stopped to investigate. Enquiries showed that our guide, who had that day been treated to a special "joy" ride in the "steamroller," had been celebrating the occasion to such an extent that he had been travelling in a circle. On being remonstrated with by the foreman, he immediately took



that worthy's left eye between his finger and thumb with the apparent intention of plucking it out. He may have been a Bible student anxious to add practice to theory. Anyway, he and the foreman rolled about in the mud under the trolley, the old "bus" trying to fall off on top of them in the meantime, using most horrible language, the foreman continually repeating "Leave go of my — eye, you — Hun!" Eventually the Bible student let go and staggered away into the darkness. It transpired later that he found a nice comfortable bed in the damp grass, from which he only emerged to frighten Langridge with his dishevelled appearance at dawn. He had forgotten about the whole episode, which indeed would afford a fine text for a temperance lecturer. We freely forgave him, and he is one of our very best men at the present time. By the way, we had to serve out frequent rations of rum in the leaky tent to keep the staff from catching pneumonia, but this is the only time I have ever seen one of our men the worse for drink.

The damage to the "bus" was soon repaired, and the critics of the Mann biplane were treated to six weeks of consistent flying without a mishap of any kind. During this period Barrs flew the machine over 10 hours at an average speed of 80 m.p.h. and a maximum of 85, he ascended on 30 occasions and carried no fewer than 18 different passengers without any untoward incident. He secured with ease a low speed of 40 m.p.h. in spite of the exceptional heavy loading. The only direction in which the "bus" might be held defective was the "climb." The falling off in this respect since August was simply due to the slackening off of the wing fabric caused by exposure in the damp and dripping tent. But in spite of her "soggy" wings the machine repeatedly climbed with five hours' fuel, gun and ammunition and two up to 3,000 ft. in 8 minutes, and that with a dead weight of over a ton and the wings loaded to 10 pounds per square foot. She frequently ascended to 5,000 ft., once to 7,000 ft., and once to nearly 9,000 ft. All the old faults had long since been eradicated, and the transmission gear gave no trouble at all. The Mann was undoubtedly the fastest two-seater "pusher" in existence, and the improvement since February was generally commented upon in aviation circles. It is my opinion that single-seater "scouts" cannot be regarded as serious "gun buses" from which proper aim can be taken, as the pilot is too occupied with his controls to give adequate attention to his gun. Such makeshift gun-carriers are only effective at point-blank range, and fall easy victims to a two-seater of distinctly less "performance."

How this improvement had been effected is a long story, but I will give my readers a few details. Contrary to general expectation, the chains by themselves gave very little trouble, the stretch was negligible, and we never had a single broken roller. Their vibration, however, was the cause of the acutest anxiety to us in the early days. This vibration proceeded from a variety of causes—wires in the original propeller brackets, too long chain guides which compelled the chain to take its slack on the sprockets themselves, insufficiently rigid radius rods, and last, but by no means least, a critical period of vibration in the engine. By sheer process of elimination we eventually succeeded in inducing the chains not to jump, and a photograph in "FLIGHT" of October 29th last illustrates their smooth running. In this photograph the chains are as rigid as bars of steel. This photograph, by the way, was taken by Barrs himself from the pilot's seat, he having left go of the controls for that purpose. The bias against chains that one is constantly meeting with is surprising. There is an altogether fallacious and erroneous impression that they break! Our shafts and couplings gave no trouble at all, and we only had trouble with a propeller bracket on one occasion. Some pseudo-experts have expressed the opinion that the resistance of chains, guides and sprockets prevent high speeds from being obtained, but the fact that we were able to attain a speed of 85 m.p.h. with a crude experimental "bus," weighing over a ton, would seem to show that there is some fallacy here. The design of the propellers involved a great deal of experiment, and we must have tried nearly a dozen pairs. The best results were obtained from the 125 h.p. engine by a pair of propellers that had proved utterly hopeless on a 100 h.p. engine. They were extremely crude in appearance, having been designed by a "wood butcher" more in joke than anything else. But with the 125 h.p. engine they pushed like elephants, giving a combined thrust of one-third the weight of the machine and licking into the proverbial cocked hat the best productions of professional propeller designers. The various propellers to Mr. Mann's own design gave excellent results, but invariably slowed the "bus" from 5 to 10 miles per hour, while the propellers designed by the professionals gave much poorer performance.

The speed and climb of the "bus" were worked up principally in three ways—(1) propeller experiment, (2) diminishing chain vibration, which absorbed quite a lot of power, and (3) streamlining transmission tubes and stays. Experiments with struts, both chassis and interpiane, produced good results, as also did lessening the

weight, but the initial ponderosity of the "steamroller" was so great that any attempt to diminish it was like sandpapering an elephant. It is the opinion of both Mr. Mann and myself that the admittedly good performance of the "bus" was entirely due to its twin propellers, for how else could a machine weighing nearly a ton and a quarter and loaded 10 lbs. to the square foot, be induced to climb at the rate of 500 ft. per minute as actually happened when she was in good form? It is very much to be doubted if any single propeller or tractor screw would have got her off the ground at all.

Our long and protracted experimental period, which really ended in August, for Barrs had merely picked up the broken thread that Pickles had dropped, had given the mysterious "technical advisers" to the Admiralty and War Office a distinct bias against the Mann. Why, I am not prepared to say, for the practical experiments that are necessary before one can standardise a new type of aeroplane had been amply justified by the results obtained. Rehearsals are always needed before a successful public performance, and aviation is no exception to the rule. It is only on paper and in drawing offices that one designs a new type that requires neither alteration nor experiment.

However, finally, we were on the point of obtaining permission to fly the "bus" for official trials, when she was "crashed" in an altogether unexpected manner. On November 16th Barrs had ascended with a passenger in an attempt to break the British altitude record. In about three-quarters of an hour he had ascended to a height of between 8,000 and 9,000 feet, and was still climbing strongly. Suddenly the gearbox seized up dead and the momentum of the whirling propeller broke the chain on the right-hand side. Please note that the propeller broke the chain and *not* the chain the propeller. The chain flew out between the two end interplane struts and vanished, as I had always prophesied it would do in the very unlikely event of a breakage, and Barrs switched off his engine and commenced a glide which lasted 21 minutes. Mr. J. G. Woodley, the passenger, was so little concerned that he calmly went on making entries in his diary, which was reproduced at the time in the pages of "FLIGHT." On nearing the ground, the poor old "bus" was caught by a strong downward current which brought her down just outside the aerodrome in a small field. She taxied into some trees, felling three of them, but although the chassis and wings were smashed to atoms, such was the strength of the fuselage that neither Barrs nor Woodley sustained the slightest injury. The passenger's escape in particular was due to the main shaft connecting the engine and gearbox making his compartment extremely rigid and unyielding. Such a smash on an engine-behind machine would have probably left no survivors to tell the tale. The initial cause of the "crash" was the negligence of a mechanic to put grease in the gearbox, though but for that wretched *remont* at the last moment the "bus" would have landed in the aerodrome without breaking a wire. Extremely lurid and misleading accounts of the accident appeared in the pages of the contemporary daily press. Such was the end of the "steamroller" after some nine months of strenuous life.

The "crash," however, got us out of one difficulty. Our canvas hangar had become almost uninhabitable owing to the heavy rains, and a miniature river was flowing through the tent from side to side. Any further flying of the "steamroller" at Hendon had become well-nigh impossible, but the *remont* that brought the "bus" down just on the wrong side of the fence effectually cut the Gordian Knot. It is worthy of note that the "steamroller" was flown three hours by Ding, three by Pickles, and 12 by Barrs, 18 hours in all, and she must have covered in that time a distance of nearly 1,500 miles.

At the time of writing, some ten weeks afterwards, we have half finished the "steamroller's" successor, M.2, who, I will venture to say without any risk of boasting, will regain for Mr. Mann the "pusher" supremacy he lost in November. M.1 all but completely vindicated the principle of chain-drive and geared-down propellers: M.2, with her loading reduced to half, hundreds of pounds less in weight, will completely do so. M.1 was built in the typical "Middle Ages" manner with great clumsy fittings and full of unnecessary weight and head resistance. M.2 will be in every way an up-to-date 1916 machine with transmission added. Her performance will astonish the few remaining critics of the type.

Invidious comparisons have recently been made between twin-engine and transmission machines, to the detriment of the latter. To my mind, the twin-engine machine weighs much more than a transmission machine, its head resistance is much greater, and it has more vulnerable points, e.g., two engines afford a better target for hostile fire than one, also they obviously require more attention. The twin-engine machine can fly after a fashion with one propeller, so can the transmission machine. On a transmission machine you can put your propellers where you like and run them at any desired speed. On a twin-engine machine you must place your engines in two particular spots, or the efficiency will suffer,

and your propeller revolutions are arbitrarily fixed. Twin-engines usually indicate twin-chassis, which are not necessary on a transmission machine. The only point where the twin-engine machine scores is in simplicity, but an aeroplane transmission, once the experimental stage is passed, requires no more attention than that of a car.

My tale is told. I have made it clear to my readers why we have persevered with the Mann biplane so long, and also that the path of the experimenter is by no means easy and pleasant, though it

may easily lead him to destruction. Ridicule and calumny are poured on him at every step, and all men wish him ill. He has to fight rigid conservatism and wrestle with invincible ignorance. His sole assets are the courage of his convictions and a saving sense of humour. But we forget the toil and danger of the past as we daily watch the Mann biplane rise like the Phoenix from the ashes of its predecessor. And perhaps this true story of how we wrested success from apparent failure may encourage others among the readers of "FLIGHT" to follow in our footsteps. *Per Ardua ad Astra!*

## PERSONALS.

*UNDER the above heading will be published weekly particulars of a personal character relating to those who have fallen or have been wounded in the country's service, announcements of marriages and other items concerning members of the Flying Services and others well known in the world of aviation. We shall be pleased to receive for publication properly authenticated particulars suitable for this column.*

### Casualties.

Second Lieutenant H. A. JOHNSTON, R.F.C., who was killed in France on March 4th, was aged 24, and was the youngest son of Dr. H. M. Johnston, of Stranorlar, Co. Donegal. He was on leave for the day with a brother officer when a shell fell 10 yards away, killing him and wounding his companion. Before volunteering as a private he was with Messrs. Siemens Brothers, and had fitted wireless installations in many parts of the world. He was undergraduate of Trinity College, Dublin.

Second Lieutenant TERENCE DONOUGH O'BRIEN, 16th Lancers, attached R.F.C., whose death was referred to last week, was grandson of Lieutenant-Colonel Sir Terence O'Brien, formerly Governor of Heligoland and Newfoundland. He was educated at Winchester and Sandhurst, being gazetted to the 16th Lancers on August 14th, 1914. He proceeded to join his regiment in Flanders on October 23rd, 1914, and was present in the action of February 21st, 1915, in the trenches at Zillebeck, when the 16th Lancers lost very heavily. He joined the Royal Flying Corps in September, 1915, as an observer, since which date he had been continuously employed.

Lieutenant GRAHAM PRICE, who was killed in France on the 9th inst., was the eldest son of Mr. and Mrs. James Price, of Earlthorpe Road, Sydenham. He was 28 years of age, and on the outbreak of war joined as a motor cyclist dispatch-rider and went out to France in September, 1914, remaining there in that capacity until November last, when he was granted a commission in the Royal Engineers, being attached to the R.F.C. He quickly obtained his "observer's" certificate, and during this period had many successful encounters with hostile aeroplanes. His appointment to the R.F.C. with the rank of pilot was gazetted on March 3rd.

Captain G. C. N. NICHOLSON, R.F.C., who was killed on March 11th while flying in England, after several months service at the front, was the only son of Sir Charles Nicholson, Bt., M.P. Captain Nicholson was born in November, 1884, and was educated at Eton and Clare College, Cambridge. In 1907 he was appointed assistant private secretary to Mr. E. Robertson, Parliamentary Secretary to the Admiralty, and in the following year went to the War Office as private secretary to Colonel Seely, then Under-Secretary for War. He became principal private secretary to Colonel Seely on his appointment as Secretary for War in 1912. He took up flying at the outbreak of war, rapidly became a proficient pilot, and had done much to inspire his political and official friends with his own enthusiasm. Captain Nicholson, who was a nephew of Mr. Reginald Nicholson, formerly manager of the *Times*, married, in 1906, the Hon. Evelyn Izme Murray, youngest daughter of Viscount Elibank, and his son John Norris, who was born in 1911, becomes heir to the baronetcy.

### Wounded.

Second Lieutenant CYRIL NORMAN SEEDHOUSE, R.F.C., who has been wounded, is a son of Mr. William Seedhouse, of Rockingham House, Newmarket. In a letter praising Lieut. Seedhouse's gallantry, it is stated that his aeroplane fought two German Fokker machines, and beat them off. Lieut. Seedhouse was acting as pilot. A fellow officer acting as observer, managed to bring the aeroplane safely to earth after Lieut. Seedhouse had been wounded.

### Death of Mr. Fred T. Jane.

By the passing of Mr. Fred T. Jane on the 8th inst., aeronautics has lost one of its strongest advocates. An expert in naval matters, Mr. Jane was quick to grasp the possibilities of aircraft both for military and commercial purposes, and in 1909 he commenced his annual, "All the World's Airships"—on the lines of his "Fighting Ships," which has made such a name for itself—giving descriptions and illustrations wherever possible of every type of aircraft produced in the world. A man of great enthusiasm and

### Marriages and to be Married.

A marriage has been arranged between Captain B. P. GREENWOOD, R.F.C., elder son of B. I. Greenwood, of Shoreham, Kent, and KATHLEEN, daughter of the late G. H. DUDLEY and Mrs. DUDLEY, of Kingswinford, Staffs, and will take place on March 21st at St. Andrew's, Wells Street, at 12 o'clock. There will be no reception and no invitations will be issued, but all friends will be welcome at the church.

The engagement is announced between Lieutenant HENRY HAMILTON KITCHENER, R.E. and R.F.C., B.E.F., son of the late Lieut.-Gen. Sir Walter Kitchener, K.C.B., and Lady Kitchener, and WINIFRED EVEREST BLUCK, daughter of the Hon. A. W. Bluck and Mrs. Bluck, of Bermuda.

Captain WILLIAM LAMBERT, R.F.C., son of Mr. and Mrs. John Lambert, of Chesterton, Cambridge, was married on the 6th inst., at St. Michael's, Kensington, by the Rev. Prebendary Denison, Vicar of the Parish, assisted by the Rev. B. C. H. Andrews and the Rev. S. Langford, to PHYLLIS MARY, daughter of the late Major ROSS FULLER and Mrs. FULLER, of St. Mark's Road, W., and granddaughter of the late Lieut.-Col. Francis Fuller, C.B., East Lancs.

A marriage has been arranged, and will shortly take place, between Flight-Lieutenant BENJAMIN TRAVERS, R.N.A.S., elder son of W. F. Travers, of Mole Cottage, Westhumble, Dorking, and DOROTHY ETHEL VIOLET MOUNCEY, only child of Captain D. B. W. Mouncey, Leicestershire Regiment, and Mrs. Mouncey, of 38, Elm Park Gardens, London, and granddaughter of the late Sir James Robert Longden, G.C.M.G.

### Items.

Captain WILLIAM CAMPBELL ADAMSON, R.F.C., of Careston, Forfar, who was killed in action against German aircraft on September 5th, aged 28, son of Mr. W. Shaw Adamson, of Careston Castle, grandson of the late Mr. James A. Campbell, M.P., and nephew of the late Sir Henry Campbell-Bannermann, has left personal property in the United Kingdom valued at £3,924.

Speaking at a dinner on Saturday in connection with the London Fair and Market, Mr. JOYNSON-HICKS said that during his recent visit to the front a German shell landed at his feet, but fortunately failed to burst. While at the front he saw a great deal of the bravery of our own troops and our Allies, and all were absolutely convinced of victory. Out there there was every indication that there was no need for the pessimism of which too much was seen at home.

M. ALEXANDRE NELIDOW, Second Secretary to the Russian Embassy, a lieutenant in the Russian Cavalry Reserve, has resigned his post in the Russian Diplomatic Service to enter the Aviation Corps. He is learning to fly in England with the consent of the British Government.

Sir GEORGE WHITE, presiding at the annual meeting of the Bristol Local Infirmary last week, announced that it had been arranged under the will of the late Mr. Francis Cape, of Bristol, that the Infirmary and the General Hospital should each receive £45,000, free from all charges.

resource and well-informed, Mr. Jane made a host of friends who will sincerely deplore his loss, while his place in naval and aeronautical circles will be hard to fill.

### A Fatal Accident in France.

It was reported from Paris on the 8th inst. that whilst an officer at the Chartres military aerodrome was flying at a height of 1,650 ft. his biplane took fire and the machine crashed down in flames, the lieutenant being killed on the spot.



# PARLIAMENT AND AERONAUTICS.

## MR. BALFOUR ON THE R.N.A.S.

INTRODUCING the Navy Estimates in the House of Commons on the 7th inst., Mr. A. J. Balfour, First Lord of the Admiralty, said:—

"Let me deal now with the Air Service of the Navy. That service entirely owed its origin to my right hon. and gallant friend (Colonel Churchill). Long before the use of aircraft had been proved by experience, my right hon. and gallant friend foresaw the important part that it was going to play in the naval warfare of the future, and he set himself to work to lay deep the foundations of a Naval Air Service. Since August, 1914, the strength of the Naval Air Service has increased tenfold. That necessarily has involved some alterations of organisation. Among other things we found that the means of educating airmen were inadequate. With the sanction of the Treasury the Admiralty purchased some months ago a large tract of land very suitably situated for all the purposes of training in flying. The Admiralty have also secured the services of Commodore Payne, who has done admirable work in connection with the Army, and I have no doubt that under his supervision with the facilities that are being placed at his disposal an immense growth in education in air matters will result. It has been said: Why should the Navy have an Air Service at all? Whether there should be a separate Minister for Air or not—a question into which I will not now enter—the Navy will always require a special service for its own purposes whoever may superintend it. The work of the Naval Air Service is largely different from that of the Army, and consequently the training for the two services must be different. For instance, no Army airman is ever required to use a seaplane or to distinguish the various types of ships, enemy or friendly, which have to be discriminated if an airman is to be a good scout over the sea. The next question is: Have these Services been so organised as to entirely prevent overlapping? It would be a strong order to say that there has never been any overlapping, but I am absolutely convinced, whatever may be true of the future, that in the past it has been an immense gain that there have been two separate departments to deal with all the nascent and early problems of this growing branch of warfare. It is all in its infancy.

"There is one branch of the Air Service which the Army have deliberately handed over to the exclusive patronage of the Navy—I mean the lighter-than-air craft. Here also there has been a great development since the war began. It was decided, rightly or wrongly, in years gone by—I think myself wrongly, though I certainly do not blame the people who came to the decision—that it was not worth our while to deal with the complicated and costly question of Zeppelins. I do not believe any prophet now living can say with confidence what the future relation between the

Zeppelin and the heavier-than-air machine is going to be. Both are improving, but perhaps the improvement in the heavier-than-air machine is more rapid and more certain. It may conceivably be that in ten years people will regard the Zeppelin as an antiquated instrument, and say you ought entirely to rely upon the magnitude of power of your heavier-than-air machines. On that I make no forecast. All I say is that at this moment it is extremely desirable that we should have lighter-than-air machines from the naval point of view in order to supplement the efforts of our Fleet by machines for scouting, which in many respects and in favourable weather are far more effective than the swiftest destroyer or the most powerful cruiser. Therefore, we have been, and are, doing our best to develop the lighter-than-air machine. The difficulty we have found—I am not talking of the Zeppelin now, but of the non-rigid types—is not so much in constructing the instrument as in housing it. In the present condition of labour throughout the country the length of time taken to build an adequate shed and shelter for these instruments is what is really checking their use. The kite balloon also has been handed over entirely by the Army to the Admiralty. It has undergone great and growing developments, and I am personally persuaded that we shall find more and more use for it at sea."

Col. Winston Churchill, in the course of his speech, said:—

"There is another matter which I cannot avoid mentioning, although I shall do so in language of the utmost precaution. A strategic policy for the Navy purely negative in character by no means necessarily implies that the path of greatest prudence is being followed. I wish to place on record that the late Board of Admiralty certainly would not have been content with an attitude of pure passivity during the whole of the present year. That is all I say upon a matter of that kind. There is one other cognate matter which illustrates what I mean. We hear a great deal about air raids. A great remedy against Zeppelin raids is to destroy the Zeppelins in their sheds. I cannot understand why all these many months, with resources far greater than those which Lord Fisher and I ever had at our disposal, it has not been found possible to carry on the policy of raiding which in the early days was carried on, and send a handful of naval pilots to Cologne, Dusseldorf, Friedrichshaven, and even to Cuxhaven itself."

Sir Hedworth Meux said he thought they were making a great deal too much fuss about Zeppelin raids. Everyone was in the same danger. The Zeppelins would do a certain amount of harm, perhaps even to the House of Commons, although he did not believe what was rumoured in Germany that any airman who destroyed the House of Commons would get penal servitude for life.

## THE HOUSE OF LORDS ON THE AIR SERVICES.

IN the House of Lords on the 9th—

Lord Montagu of Beaulieu asked His Majesty's Government whether, in view of the great and growing importance of aviation in modern warfare both by sea and land, and the need for special attention and effort being concentrated upon it, they would create a separate Ministry to deal with the whole question. Before dealing with the subject he thanked their lordships for their sympathetic references to his rescue when the "Persia" was sunk. He regarded the question he had placed upon the paper as a matter of more than ordinary importance. The need for concentration upon problems dealing with aviation was very great, and had now become so insistent that more steps should be taken than were likely to be taken by the Government. He was aware that in this country we never took a bold stroke at once unless there was great weight of public opinion in its favour. Everything must be subordinated to the needs of the war, and although he welcomed the appointment of the Committee over which Lord Derby was to preside, which was in itself an admission of weakness, he wished to convince the Government that there was need for something bigger with wider powers and with a man of imagination and foresight at its head. He knew he had been classed with the unfortunate body of people called prophets who were received first with derision, then with contempt, and afterwards with dislike, but he wished to point out that he had called attention to this matter in 1909. If the Committee he had suggested in 1910 had been appointed the problem of aviation would not have been neglected and we should not have been in the position we were to-day. One of the difficulties he had to confront was the danger of saying too much. Everything said in either House of Parliament was known in Germany in a few days, and he could not therefore deal with the technical aspect of the subject. Very little of importance in this country was not known to the German General Staff, for their means of information were very extraordinary. It was also necessary to remember,

before blame was directed to the naval or military authorities, that there was no experience upon which to build a policy, and that in this country to suggest anything novel was always to be condemned. There had been opposition from the heads of departments and from the Treasury, which had retarded the efforts of those who wished to push on with aviation. He did not wish therefore to criticise the heads of the naval and military departments, though they had not done all he could have wished them to do, and had in the last few months been hampered by other departments. He was glad to see that Sir David Henderson had been appointed to the Army Council, and wondered if that was the result of his question having been placed on the paper. It was, at any rate, a step in the right direction.

With regard to the suggested Ministry of the Air, he admitted that only a year ago he was very doubtful whether the Air Service should not run on its present system divided into two branches, for there were great difficulties about combining the services, and there were prejudices which it would be very hard to overcome. But it could not be denied that the present position of our Air Service was very unsatisfactory. A year ago, and even last summer, a German aeroplane was hardly ever seen over our lines in Flanders, but now he feared we had lost our air supremacy. It was our duty at all costs to regain it, and we should not regain it until our present system was altered. The Germans now had aeroplanes which could fly faster and ascend more quickly than ours. At home we had had about 25 visits from Zeppelins, and with the exception of part of a propeller found in Kent this week there was no evidence that any Zeppelin had been seriously damaged. That alone proved we had not had enough energy. He was sorry Lord Derby was not present, and had it been possible he would have asked for the debate to be postponed. But the Committee over which Lord Derby presided was merely one which allocated the production of our factories to the Army or the



Navy. It was merely a departmental committee, and though other powers might be thrust upon it, it had been appointed merely for the purpose he had stated. That would not take us very far. He had seen no fresh arguments against the appointment of a Minister of Aviation. They were precisely the same arguments as those which had been urged against the appointment of a Minister of Munitions, and every one knew what the effect of that appointment had been. It was said you should not swap horses while crossing a stream, but if one horse was drowning, it would really be wise to take the other. The whole question was whether the difficulties of machinery were to be made into a stronger argument than the efficiency of the service.

The proper motto was "One Element one Service." The real difficulty at the moment was said to be that his proposal, if carried into effect in a time of war, might produce confusion. He was one of those who believed, however, that possibly that conclusion was exaggerated. He thought that they would eventually, and very soon, get the men to work together.

The first function of such a Board would be the function of supply and construction. The Derby Committee to-day, he believed, had to do with supply, not with construction. He would also like to see the Board of Aviation deal with the question of future policy; it should be able to inform the future staff what was the best kind of machines to construct for certain purposes. It should include a representative certainly of the Admiralty and of the War Office; men of commercial manufacturing experience, and also a member of the General Staff or a delegate from that staff. At the present moment there was a Parliamentary responsibility. If anything went wrong with the Air Service or Zeppelins came over and did harm to this country, who was the Minister responsible? He had never discovered any Minister who was particularly responsible. If questions were now asked about the air defence of London, it turned out that there had been four different stages in regard to its organisation. The very fact that they had such vacillation proved to his mind that it was almost impossible for the Army and Navy to carry out the proper organisation and control of the air service of this country.

He did not propose at this stage to ask the Government right away for a Ministry of Aviation. A great deal had to be thought out before that organisation could be established. But he thought they ought to take the Derby Committee, give it more power, and make it the germ of what might come later. The Chairman of that Committee should certainly be a member of the Cabinet or of the War Council. But to leave the Committee as it was, merely an interdepartmental Committee, was only touching the fringe of the question, and was not going to do any real good at all. At the present time the Air Service was merely auxiliary to the fighting forces of the Navy and Army. He could see a time coming when the Air Service would be more important than either the Army or Navy. We were so close to the Continent as to be vulnerable to attack by a nation which had organised its air service, and the danger would increase in years to come. We must get into the habit of looking at the Air Service not as an auxiliary to the Army and Navy, but as a great service which was an establishment of itself and to which we should have to look in future years largely for the defence of this country. It would take many years before the full value of air power was realised. He believed it was the logical outcome of the present system of warfare that the greater part of our future warfare would be in the air. The soldier to-day had become a cave-dweller; he had to dig himself in the ground and stop there the greater part of the time. At sea many of our sailors had become diving men. The power of the great gun and the power of explosives would tend more and more to drive the issue of battle into the element of the air. Therefore we must learn a lesson from the present system of fighting. We were led irresistibly to the conclusion that the supremacy of the air was the goal to which this country should strive.

Then there was another aspect. All war would become more and more scientific, but warfare in the air would become more scientific than anything which had preceded it. And as it became more scientific our foes would become more dangerous. That being so, it would become more important that the foresight which had to be exercised and the organisation of this great service should not be left to a divided responsibility. There should be one responsibility, and one only. The three problems to be dealt with were simple enough, but they required all the brains at the disposal of the country to solve. They were, first, the provision of powerful enough aeroplanes; secondly, the provision of powerful enough anti-aircraft guns; and thirdly, the construction and building at once of airships of the Zeppelin type for this country. As regards the first point, he thought it would be admitted as necessary. As regards the second, our anti-aircraft guns with few exceptions were of far too small a calibre and nothing like powerful enough to do serious damage to a Zeppelin. Anyone who saw the raid of last September must have

thought it tragic and pitiable that the shells fired at a Zeppelin flying 7,000 ft. high burst at the extreme range of about 5,000 ft. To do any real damage quite a big gun was needed. The modern Zeppelin consisted of about 20 balloonettes, and unless you could set it on fire or tear the envelope the airship, if struck, would probably get home and become a formidable adversary on a future occasion. There was at one time a great contempt in this country for Zeppelins, and a conviction that they could always be overcome by aeroplanes. He had never subscribed to that view. For proper defence against aircraft you must have both kinds of aircraft, and to depend on aeroplanes to destroy Zeppelins was a great mistake.

Then we should do to our enemies what they have done to us. They attacked, and were going to attack still more, our manufacturing districts, while we had never attacked theirs to the same extent. Yet there were points on our frontier in Flanders which were far closer to Essen and the great industrial districts of Westphalia than our industrial districts were to the nearest for the German airships. We were absolutely unable to give a proper reply, which was the bombing and destruction of the hangars of the enemy beyond the horizon of his manufacturing districts. In order to convince their lordships of the seriousness of the modern Zeppelin, he would quote a few particulars. Every one, he supposed, would grant that the number of Zeppelins possessed by Germany was still considerable. Within the last few days he had talked with a neutral who had come from Berlin and who was in a position to know what he was talking about, and he had put the number as high as 50. He himself (Lord Montagu) thought it was between 30 and 40. There were a certain number on the Russian frontier, but there was a possibility of their putting a fleet of not less than 20 in the air at this moment. That was a formidable fleet when it was remembered that each Zeppelin could carry 1½ to 2 tons of explosives and thermite and oxide of aluminium for fire-raising purposes, materials under which steel melted like thin wax and which nothing could resist. The great danger in this country was not from explosives but from fire, and he would like the Government to consult fire experts, such as the London Fire Brigade and the fire brigades of our great cities, on that subject. If a thermite bomb were dropped on any of our big cities, one would not like to contemplate the loss of life that would ensue and the shock to our national nerves.

The length of the most recent form of Zeppelin was over 560 ft. and would shortly be over 600 ft.—or getting on towards three times the length of Westminster Hall. They were 65 ft. in diameter, and furnished with four engines and propellers. They had a radius, or would shortly have a radius, of 2,000 miles. The distance from Ghent to London was only 160 miles, to Sheerness only 120 miles, to Dover 110, and to Portsmouth 212, while our manufacturing districts as far west as the west of Staffordshire were not more than 250 miles. From Emden to Hull it was only 300 miles, to Newcastle 320, and to Manchester 350. To the Firth of Forth it was only 450 miles, to Cromarty Firth 530, and to Scapa Flow 550; so that if they considered the range of these airships they would have to extend their ideas considerably of the danger that might exist. He believed it was more serious than the aspect on land. If the German Fleet came out, and came out at a time that suited the Zeppelins, although their aid might not redress the balance against the superiority of our Fleet it would cause extra losses, it would make the tactics of our Fleet more difficult, and might even have a serious influence on the battle itself.

Some people said we ought to try to defend this country to a large extent by artillery, and he was sorry to hear the Secretary for War say the other day that the building of certain anti-aircraft guns had been accelerated to the disadvantage of other guns in order to cope with this danger. They might just as well try to retain the supremacy of the sea by means of a few forts along the coast as to cope with Zeppelins by setting up artillery all over the country, unless—as was unthinkable—they were going on the idea of having these guns round all the great centres. The extreme range with the guns we had—he would not give the figure—but he would say that Zeppelins could rise higher. They could fly to a height, he believed, of 15,000 ft., and any gunnery expert would tell them that accurate shooting at an object travelling at that height was a very difficult thing.

The airships that attacked us did not come over at their top speed, but at an economic speed—about 35 miles an hour—but when they were here, if they were fired at, they could go up to well over 70 miles an hour. To hit an object flying at 70 miles an hour when you did not know the wind at that height was beyond the science of gunnery. The only way to overcome Zeppelins was to carry the war into the enemy's camp, and for that they required powerful aeroplanes to bomb the enemy's territory and hangars. He was aware that there was a new air engine coming out in Germany of 225 horsepower, and an extraordinarily light plane which was likely to give extraordinary results. In this connection it would be worth while to take note of the fact that in France and Germany all the finest guns

as well as the finest planes came out of private factories. He doubted very much the wisdom for any branch of military equipment of setting up Government manufactories except on a very small scale. It was on the big firms they must rely when the time of strain came. The French had more powerful planes than we had, and it was right to acknowledge the debt we owed them. We were copying many of their planes in our workshops, and they had been very generous in the way they had helped us.

Lord Montagu then quoted references showing how he had warned the Government for many years, and he went on to say that what we had to look at now was our policy in the future. There was no comfort in the phrase that "no damage had been done of military value." The truth was, we had had stupendous luck up to now. He knew one case where a great munition works escaped by a few yards, and that in the raid of January 31st one of our most important machine-shops for making air-engines was only missed by a few yards also. That luck could not be expected in the future. Sooner or later not only large manufactories would be destroyed, but an immense damage done in the country. The subject was a very serious one. He had tried to say nothing which would help the enemy. He could tell of scandals which until a few days ago were still going on—of one which was worse than a scandal, for the man responsible for it ought to be hanged. Our shores were within easy reach of the enemy. We were unprepared to resist or to destroy any Zeppelins that came over in force. The advantages of our insularity were rapidly disappearing. Even those of meteorological conditions were diminishing. Upon the efficiency of the Air Service now and in the future much would depend; and if he would end on the note of grave warning he would say—Let it not be said with shame of our generation that we did not trouble to guard in the air what our forefathers won on the sea.

Lord Oranmore and Browne said that about three weeks previously he raised the question of an Air Ministry, but not much encouragement was given to the suggestion by Lord Kitchener. He was surprised, too, that cold water was thrown on the scheme from various parts of the House. The Cabinet having reached its present unwieldy dimensions, it did not matter much whether it consisted of 21 or 31 members. The great disadvantage of leaving the control of the Air Service in the hands of the Army and Navy was that they would be more concerned with the particular needs of their own services, and would fail to look at the matter from a broader point of view.

Viscount Haldane said he was in entire agreement with the two noble lords, but the question was not what we desired but how we were to get it done. A Minister of the Air was suggested, another Minister to be added to the already very large Cabinet. But what was the new Minister to administer? The noble lord had suggested that he might look after the *personnel* not only of the defence of London, but of the whole Air Service. He wondered how Admiral Jellicoe would like to have under him in the North Sea airmen over whom he had no command.

Lord Oranmore and Browne suggested that the Air Minister should be responsible for home defence and the supply of aeroplanes, but that aeroplanes and airships when co-operating with the Army or Navy should be under local command.

Viscount Haldane said that really meant there were to be three services instead of two. We should be worse off than ever. If the men were not trained under those who were to be responsible for them and there were three services instead of two there would be still greater confusion. To him it was clear there were two quite distinct questions. One was how the machines were to be used, and the other was how the requisite machines were to be provided. Owing to the division of energy we had suffered, for we had not been able to concentrate all our resources. But, after all, this was a question of settling first principles.

We had heard a great deal too much of push and go, what was called violent action before thinking, instead of violent thinking before action. He wanted to see a little more violent thinking introduced into this problem. In every respect the lesson of the war had been the clear necessity of getting clear conceptions of our wants and working them out. That principle had been developed in military affairs and perhaps in naval affairs. It was absolutely necessary that we should apply it now if we were to make any real progress with aircraft. He had had a good deal to do with the early question of aircraft, and in order to get at first principles the National Physical Laboratory had been taken for Lord Rayleigh's Committee to work on what was required, and experimental practical work had been carried on under the direction of Mr. O'Gorman. The result of that work had been that, although somehow this country had not taken a real interest in the Air Service such as that taken in France and Germany, we had very early in the war established our supremacy in the air. Now we were far behind, but not in construction, and not in design.

When he came to speak of Zeppelins he had a different tale to

tell. The Zeppelin was an invention of the enemy in which we were lamentably behind. Speaking for himself, he thought we missed a great opportunity of applying to the construction of Zeppelins the same amount of science that we endeavoured to apply to the construction of aeroplanes. He believed that if the same course had been taken we should be much farther advanced than we were to-day. As it was, the progress had been very uneven. At the present time what they had to be sure of was that the same amount of science was being devoted to the construction of the Zeppelin as was devoted to the construction of the aeroplane. He did not know what course the Government were taking in this respect. But he did not think it was possible to turn round suddenly and take the construction out of the hands in which it was at the present time. He would be sorry to see the control of the direction of the Army Air Service in any way removed from General Henderson. He put down our want of progress to a want of seriousness about the construction. We had to make up for neglecting science. There were departments in which the most scientific consideration had been devoted by other nations to problems which would arise immediately after the war. He wished he could be certain that we were devoting anything like the time we could to that kind of reflective consideration. He was sure we were not.

The question before the House was not a question of making some energetic person Minister of the Air and saying, "Now produce something." If he were appointed then in a very short time the silken rope to which allusion had been made would be about his neck. He agreed that in the future the war in the air was likely to play a much greater part than it did at present: how great, it was useless to prophesy. All we knew was that we were far behind in the matter of scouting; and we were materially hampered in not having a fleet of Zeppelins. But we should not make matters better if we snatched things out of hands in which they were and put them in the hands of somebody who had probably had less experience than those who were handling them now. What they had to do was to strengthen the scientific foundation on which the service rested at the present time, and to make sure that no action was undertaken which did not rest upon a basis of carefully considered action.

Lord Beresford said he entirely agreed that the new air warfare was going to be perhaps of so tremendous a character that it might supersede the Army and Navy. Anyway, we should be ahead in the air the same as we were on the water. Zeppelins were a very great danger. If they dropped explosive bombs which contained explosive liquid the fire could not be put out except with sand. Therefore once they dropped them over magazines or arsenals the danger would be extremely great. He proposed that Zeppelins should be built as soon as ever it was possible, for the simple reason that in all war machines you must meet like with like. And Zeppelins must be met with Zeppelins. The reason why we did not raid enemy places as we did at the beginning of the war was that the machines we bought were bad machines and had not got air endurance. If we had taken English artisans and had machines of English manufacture we should have been a great deal more advanced. We had lost several of the finest young men in the world by sending them up in bad machines. It was murder to send men up in this way, and the money we had spent uselessly was fabulous. With regard to the suggestion for an Air Minister, he did not think it would help the case, and he did not agree with Lord Montagu in having only one air service. An air service was needed for the Army and another for the Navy. The soldier and the sailor ought to consider carefully what he wanted for certain purposes, and then the thing should be turned over to the scientific man to consider how it should be made. The only thing we could do at present was to fit the best machines we could to cover the distances Lord Montagu had mentioned, and then weekly—and daily if possible—attack the German Zeppelin sheds. He suggested a small committee for the Army and a small committee for the Navy, and that they should consider the question of designs for the air service.

The Marquess of Lansdowne: Lord Montagu has been appositely described as a prophet in connection with this particular subject; and to-night he appears not only as a prophet but as a physician. He gives us a diagnosis of the disease and prescribes the remedies.

No one, I think, will deny that there have been very serious shortcomings in connection with the air service of this country, and that it is our duty to devote all our energies to correct the defects which have arisen, and I would only ask people to remember that this science is still in its infancy. It is undergoing the most extraordinary and rapid developments. Just as there have been new developments in trench and submarine warfare, so there have been rapid developments in aerial warfare, and accordingly it is impossible to say that the Army or Navy should at any given moment have been supplied with standardised equipment of any particular kind or



class of weapon. Nor must it be forgotten that in the case of equipment for aerial warfare we have to contend with the great difficulties due to the stupendous and wholly unexpected efforts which this country has been called upon to make.

But I should be sorry to say anything that might be taken as an admission that there was no other side to the picture than the somewhat depressing picture which has been drawn by Lord Montagu. The improvement in the quality of our military equipment has been very remarkable indeed. In the first place, as far as warfare at the front is concerned, we have certainly not been outclassed by our opponents. I say that in regard to the quality of our equipment. In regard to quantity, I am told that, taking first the number of machines, the output per month is at the present moment twenty times that of peace, and this will more than double itself during the summer, and that in spite of the fact that there has been a large percentage of casualties, which, I am glad to say, have all been replaced. With regard to aeroplanes, the output per week is about three-quarters of that for the whole of the year ended August, 1914. All the original types of aeroplanes which accompanied the Expeditionary Force in August, 1914, have now been replaced by something better, and this progress continues. With regard to the number of units, I am told that by the end of the month the number of squadrons abroad will be eight times those which accompanied the Expeditionary Force in August, 1914. I mention this because there is a certain tendency to lose sight of what has actually been done by those responsible for our Air Service, and for the important results which they have accomplished.

With regard to air raids on this country, so far as our experience has gone, I should be inclined to say that what people have resented most is not so much the extent of the damage that has been done by those raids as the impunity with which they have been carried out. So far as the success of those raids goes, I doubt whether their material or moral effects have been at all considerable in proportion to the effort which they must have cost our enemies. It is true that there has been a regrettable loss of life, particularly among non-combatants, and that there has been considerable destruction of buildings. But I do not think it will be said that those occurrences, however regrettable, have really advanced the cause of our enemies or brought them any nearer to a satisfactory conclusion of the war. As regards their moral effect, I certainly have neither seen nor heard any sign of panic, although there has been a feeling of very deep indignation, accompanied by a resolve to support the authorities in any precautionary measures which can be taken to guard against those raids.

I say that without any idea of suggesting that we desire to ignore the warning with which my noble friend concluded his speech. On the contrary, we do fully realise that this danger of invasion by aircraft is a very real danger, that it is one that might at any moment threaten the bases of our Armies abroad, and that it is our duty to take every possible precaution to meet it. There is no idea of suggesting that inferior guns or less trained gunners should be employed on this service. On the contrary, it is intended that the best guns and the best men shall be appointed, and that the air service shall be regarded as interchangeable with service at the front. The main complaint made is that the air service is wanting in organisation, that there has been a dispersal of effort, a scramble between the two services, and the absence of a comprehensive and directing policy. As to policy, I am not quite sure that I know what is in our critics' mind. I think I do know what is in their minds when they talk of military policy or naval policy, although I shall always maintain that the two form part of a single policy for the defence of the country, and, for the matter of that, for the defence of the Empire—a single policy directed by a single controlling Government. I find it as difficult to think of a separate air policy as of a separate military policy or a separate naval policy, because, unless I am greatly mistaken, the air service must be to a great extent auxiliary to the Army and Navy. The Navy will always insist upon having an air service of its own, and a like claim will be put forward by the Army. The proper way of looking at the question is to recognise the air service as a most important ally to the other two services, to put it alongside of them, and to see that if there is a tripartite policy it is really directed from one controlling source and in accordance with the general needs of the country and the Empire.

We are asked, what have we been doing. We have appointed the Joint Air Committee. It is presided over by Lord Derby, a public man who stands very high in the estimation of his fellow-countrymen. He is not in the Cabinet, but he is as well known, at least, as most members of the Cabinet. He is certainly in a position which will not deny him any opportunities which he may seek for

ascertaining the mind of the Government and keeping in the closest possible contact with their councils. On the committee there are three distinguished officers representing the Admiralty, two representing the War Office, and as it may summon to its assistance advisory members, there is an opening for calling in that special scientific knowledge upon which Lord Haldane so properly insisted. One of the committee, Sir David Henderson, has just been appointed a member of the Army Council; and the committee is to have for its secretary and assistant secretary the secretaries of the Committee of Imperial Defence, whose knowledge and experience will be of great value. The committee is to have a free hand to deal with questions of design, production and distribution. I think that reference covers the points upon which Lord Montagu insisted as being the most important. It is also to be remembered that it is precisely in regard to those questions that outside criticism has been most pronounced. When I am told that the Derby Committee should be in a position to deal with air policy, I would say that general policy cannot be dealt with apart from those three questions. To sum up the functions of the Derby Committee, its business will be to ensure that the manufacture of supplies and the distribution of material shall be in accordance with the policy of aerial warfare laid down by the Government. It is said that the recent speech of Lord Derby in this House showed that the scope of his functions was necessarily limited. I think Lord Derby's language has been rather unfairly interpreted. I heard Lord Derby's speech. I admit it might have left an impression on some minds that Lord Derby was desiring to minimise the importance of his own committee. What I think Lord Derby really wanted to explain was that he had no executive functions, and that for that reason he was not to be held in any way responsible for the air defence of London or the United Kingdom. That is perfectly true, but, while not having any executive functions, with that reservation, the position of Lord Derby and his committee is extremely powerful, and there is no portion of the field of inquiry from which he and his colleagues are excluded. Lord Derby will, I am sure, be glad to give the House information about the work of his committee.

I may be asked why, having gone so far, we do not pluck up a little more courage and appoint a minister with a full-blown department subordinate to him. We shall not be deterred from making an arrangement of that kind because it would add one more to a somewhat numerous Cabinet. But it does not seem to me that such an arrangement would give any advantage beyond that derived from the present arrangement. Although I have readily admitted there are imperfections to be removed, it has never been established to my satisfaction that the only way to remove them is to appoint a Cabinet Minister to deal with them. What really matters is the essence of the arrangement, not the particular style or title you give. A great many of the mistakes are the mistakes of subordinates which would have been committed even with a Cabinet Minister at the head of the department. As the matter stands we have a very strong committee with a strong man at the head, and we have given them access to every source of information, and to every branch of the subject of aerial warfare. We have given them liberal instructions which we trust will be interpreted in a liberal sense. That is a business-like arrangement, which is a great advance on anything we have had. It promises well, but I am not here to say that in our opinion there should be any finality about this arrangement or that we exclude altogether the possibility of further development. Experience will show whether the present arrangement will work, and what further changes are desirable. Meanwhile I am not prepared to admit the country is undergoing any detriment because we have stopped at this point. The committee is doing its work well, and we may trust it to take advantage of the wide latitude which has been given to it. I trust the committee will not disregard the emphatic warning which the noble lord has given to it and to the country.

Viscount Middleton asked that the pressure of public opinion should not be allowed to influence officers to fly at night in unsafe conditions.

The Marquess of Lansdowne promised that the matter should be considered.

Lord Montagu said he had no reason to complain of the attitude of the Government except that he feared they did not yet realise how important the subject was. He thought the position was bound to be regarded as unsatisfactory when we had only one engine to every three planes, and that engine not the best kind. He hoped the Derby Committee would effect an improvement, and would itself become something like the Board of Aviation he desired.

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floods at San Diego, Cal., destroyed the telephone wire an aeroplane carried a rope across the flooded district, and with this rope a telephone cable was hauled through the water, thus enabling a connection to be made between the broken lines.

## A New Use for Aeroplanes.

How an aeroplane can be used to assist long distance telephone engineering is indicated by a report from America that when recent



# AIRCRAFT WORK AT THE FRONT.

## OFFICIAL INFORMATION.

### British.

*General Headquarters, March 10th.*

"Yesterday we carried out a successful aircraft attack against the hostile railhead and billets at Carvin. It is believed that considerable damage was done. Thirty-one machines took part in the raid and all returned safely."

"As the result of a fight in the air a hostile machine and one of our own machines were brought down near Tournai."

"Last night the enemy made bombing attacks against two of our craters near the Hohenzollern Redoubt. Both attacks were repulsed. To-day there has been much artillery activity on both sides about Loos, the Hohenzollern Redoubt, and between Quinque Rue and Fauquissart. North of the latter place we damaged a hostile mine shaft by our artillery fire."

*General Headquarters, March 17th.*

"Yesterday there was much aerial activity on both sides. Thirty-two hostile machines were engaged. One was driven down near Lille, and a second shot down in our lines. To-day another German machine was forced to descend in our lines."

### French.

*Paris, March 7th. Evening.*

"In the Argonne, in the region of Avocourt, our special guns brought down a German aeroplane, which fell in our lines. Both aviators, who were wounded, were taken prisoners."

*Paris, March 8th. Evening.*

"Aeroplane bombardment squadrons, consisting of 16 machines, dropped 124 bombs of every calibre on the station of Metz-Sablons, where there were several trains. The projectiles found their mark. A squadron of enemy aeroplanes attempted to pursue our machines, which returned to their starting point, with the exception of one aeroplane, which was compelled to land as the result of engine trouble."

*Paris, March 10th. Afternoon.*

"Contrary to German assertions, the aerial bombardment of Metz effected from French aeroplanes is understood to have been productive of good military results. A munition train and a troop train are stated to have been destroyed."

"On March 8th, our aircraft displayed particular activity. Numerous actions were fought by our machines mostly over the enemy's lines. During these aerial encounters 15 German aeroplanes were put to flight. Ten were seen to plunge vertically into their own lines, and, according to definite information, two German machines, one of which was a Fokker, were brought down in Champagne and three in the region of Verdun. These machines fell into the German zone."

*Paris, March 11th. Evening.*

"To-day in the region of Douaumont one of our aeroplanes brought down a Fokker, which fell in flames in the German lines."

*Paris, March 12th. Evening.*

"This morning Sub-Lieutenant Guynemer brought down a German aeroplane, which fell in flames in our lines near Thiescourt. This is the eighth aeroplane brought down by this pilot. Six of these fell in our lines and two in the German lines."

"Another of our aviators also brought down an enemy aeroplane in our lines near Dombasle, in the Argonne. The passengers of the two machines thus destroyed were killed."

"The same day our squadrons of fighting aeroplanes fought eighteen actions in the air in the region of Etain, putting their adversaries to flight."

*Paris, March 13th. Afternoon.*

"One of our bombarding air squadrons, during a night flight, dropped thirty bombs of heavy calibre on the railway station of Conflans. Five outbreaks of fire were noticed. In spite of a violent cannonade all our machines returned safely."

*Paris, March 13th. Evening.*

"During to-day our army corps and battle air squadrons displayed remarkable activity in the whole of the Verdun region. A squadron, composed of six aeroplanes, dropped 130 bombs on the strategic station of Breulles, north of Verdun."

"Very numerous actions were fought, in which the advantage lay indisputably with us. In the course of these actions three German aeroplanes were brought down, one in our lines and the two others

in the first German lines. Other aeroplanes were seen falling, but their destruction could not be verified."

### Russian.

*Petrograd, March 7th.*

"The enemy's artillery violently bombarded the region south-west of the island of Dalen, his fire being directed by means of five balloons."

### German.

*Berlin, March 7th.*

"One of our airships heavily bombarded during the night the railway establishments of Bar-le-Duc."

*Berlin, March 8th.*

"Our air squadrons bombarded the villages west of Verdun, where troops are concentrated."

"The railway line from Ljachowitchi (south-east of Baranovitschi) to Lunieni-ce, along which considerable traffic had been observed, was attacked by our aviators with good results."

*Berlin, March 9th.*

"In a series of aerial engagements in the neighbourhood of Verdun our aviators remained victors. It is certain that three enemy aeroplanes have been shot down. All our aeroplanes returned safely, but several of their brave pilots were wounded. The enemy troops in the villages to the west and south of Verdun were heavily bombarded."

"By an attack delivered by a French aeroplane squadron within the radius of the fortress of Metz two civilians were killed and several private houses damaged. In an aerial battle the machine of the commander of the squadron was shot down. He was taken prisoner. His observer was dead."

*Berlin, March 10th.*

"Our battle-aviators shot down two English aeroplanes; namely, one monoplane near Wyttschaete (to the south of Ypres), and one biplane to the north-east of La Bassée. The occupant of the first machine is dead."

"In the month of February the activity of our air-units as regards attacks and the number of their far-reaching reconnoitring and nocturnal squadron expeditions behind the enemy front were considerably greater than ever before. The following schedule not only again proves our superiority, but also refutes the assertion so beloved by our opponents, that our losses in aerial warfare are so small because our aeroplanes do not dare to fly over the enemy lines."

"The German losses on the western front during the month of February amount to:—None in aerial battles, none by being shot from the ground, six missing. Total six."

"The French and English have lost:—Thirteen in aerial battles, five by being shot from the earth, three by forced landings within our lines. A total of 21."

"With regard to this, it must be observed that we have based our figures only on the machines which have fallen into our hands, or which have been observed to fall down in flames, and not the numerous other machines of the opponents shot down behind the enemy lines."

*Berlin, March 11th.*

"A French aeroplane hit by our anti-aircraft guns fell in a burning condition south-west of the Château Salins, between our lines and those of the enemy. The occupants, who were dead, were secured by us, together with the debris of the aeroplane."

*Berlin, March 13th.*

"Owing to the favourable conditions for observation, artillery activity on both sides along the greater portion of the front has been very lively, and has increased in violence on both sides of the Meuse and up to the Moselle."

"After considerable reconnoitring activity our airmen have successfully attacked railway buildings and dugouts, especially on the railway from Clermont to Verdun. Three enemy aeroplanes were destroyed, two in Champagne and one in the Meuse district."

### Turkish.

*Constantinople, March 8th.*

"The activity of our aviators prevented reconnoitring flights over the Dardanelles by enemy aviators, who fled as soon as they saw the approaching aviators."

*Constantinople, March 13th.*

"Two enemy aeroplanes unsuccessfully bombed two transports in Akbach Bay."

## From Other Sources.

Mr. W. L. McAlpin, writing to the *Daily Mail* from Paris on Monday regarding the fighting round Verdun, says:—

"To supply the thousands of tons of material, most of which comes from Metz—the military forwarding station of Metz-Sablons

has been persistently bombarded by French airmen, resulting in considerable damage and delay—takes time, and, despite the marvellous efficiency of the German transport service behind the lines, some such interval as the present became imperative. . . .

"The splendid part played by the French airmen in the battle cannot be too highly praised. The French artillery owe their comrades of the air no mean debt. Without them the men behind the guns would many a time have been helpless. Not only have the French airmen demonstrated their complete mastery and driven back the enemy's machines, but they have also flown over the German positions and watched their supply trains and reserve formations and spied out their gun emplacements. At night when it has been impossible to conduct reconnoitring flights they have not been idle, but with heavy aeroplanes loaded with bombs they have raided the German lines of communication and blown up munition depôts."

Writing to the *Daily Telegraph* from Milan on March 7th, Mr. A. Beaumont says:—

"The suspicion that after further progress against Verdun is hopeless the Germans may attempt a new diversion against Belfort has been confirmed by news from the Swiss border, where numerous reconnoitring flights by German aeroplanes over the Belfort territory have been observed within the last week.

"These aeroplane flights are periodical warnings of contemplated German offensives. They invariably precede some attack, and, judged from this peculiarity, the presence of swarms of aeroplanes over Belfort might be ominous. French aviation squadrons have, however, also been scouring the air, and have frequently cut short the German incursions, compelling their enemies to beat a hasty retreat. The inhabitants of Belfort last Thursday witnessed a thrilling aerial flight over their city, which ended in the discomfiture of the Germans. The object of the enemy evidently was to be informed of the movements of the French reserves near Belfort, and, according to German reports, the enemy fears a big French offensive against Alsace."

The correspondent of the *Petit Parisien* at Salonika reports that two German aeroplanes on March 6th crossed the French lines. They were received with a violent cannonade, and were soon forced to retreat, pursued by two French aeroplanes armed with machine guns, which engaged them south of Monastir. The French aeroplanes returned, and reported that they had not succeeded in destroying the Germans, but that they believed that one of them had been damaged, as it had come to earth precipitately."

The military critic of the *Journal des Debats* writing on the subject of the Verdun battle, says that it is not generally known that the Zeppelin brought down at Revigny had as its definite mission to ascertain the strength of the French reserves.

The *Times* correspondent in Paris, writing on March 9th, says:—

"A Zeppelin tried on Tuesday night to repeat the attempt which ended so disastrously a fortnight ago to bombard Revigny Station.

"According to accounts given by refugees from the Verdun district, a Zeppelin flew over Revigny at about 1 o'clock in the morning and from a height of little more than 1,000 yards dropped several bombs, none of which did any damage. During the bombardment the stationmaster, with great presence of mind and coolness, succeeded in shunting a train of munitions, which was in the station at the time, to a place of safety. The stationmaster and two other officials have been decorated with the Croix de Guerre in recognition of their act."

A Central News message from Dunkirk dated March 9th says:—

"A torpedo-boat engaged on patrol work sighted a German seaplane yesterday adrift in the sea some miles from this port. The machine had tumbled into the sea after being damaged by the fire of the French batteries.

"The German pilot was dead, but the observer was hanging on the floats, and was rescued and taken aboard the torpedo-boat, which towed the debris of the machine into harbour."

From Athens, on March 8th, an Exchange correspondent writes:—

"Four French aeroplanes yesterday bombarded Ghevveli, killing and wounding many Bulgarian troops."

The special correspondent at Rotterdam of the *Daily Telegraph* in an account of the reported cruise of the German Fleet in the North Sea last week, says that Dutch fishing trawlers arriving at Ymuiden state that two Zeppelins hovered above the fleet. He goes on:—

"For some time past there have been stories by neutral and other vessels returning from the North Sea of the appearance of small flotillas of German vessels, always moving in co-operation with airships. The latest story is that during the last Zeppelin raid on England an attempt was made by three armoured cruisers, accompanied by destroyers and submarines, to carry out a raid on the British coast. It is stated that a Zeppelin was in attendance, and carried out reconnaissances ahead of the squadron, which resulted in its reporting British precautions, making it necessary for the warships to give up the project and turn tail."

The *Daily Telegraph* correspondent in Paris, writing on Monday, says:—

"Flight-Lieutenant Guynemer, aged 21, and another aviator

who is just 20, two French air heroes, tied until yesterday, each having brought down six German aeroplanes. Guynemer is now ahead with his bag by two, for he brought down his eighth German machine yesterday. The dry official communiqué now calls him second lieutenant. In previous statements he was styled Sergeant Guynemer. This is the only announcement that he has been awarded promotion, which is certainly well deserved.

"Lieutenant Guynemer is the son of a Paris tradesman. He finished his aviation apprenticeship only last June, and brought down his first enemy aeroplane on December 5th. He soon increased his bag, bringing three more down on December 8th, 11th and 14th. This last performance was an extraordinary feat. He was pursuing a Fokker over the enemy lines, actually grazing his opponent's machine with his wheels. As he passed he shot the German aviator dead. His machine was badly damaged, and he alighted with only one wing. His favourite machine is a small biplane which does 100 miles an hour."

Mr. A. Beaumont, writing to the *Daily Telegraph* from Milan on Monday, says:—

"A note has been issued by the military Governor of Bologna warning the inhabitants along the Adriatic coast against infected sweets dropped by Austrian aviators. It was observed, in fact, that during the incursion of the enemy aeroplanes at Ravenna and Codigoro, on February 13th, Austrian aviators dropped little packages from the sky which contained sweets. These packages were picked up and submitted to chemical analysis. They were found to contain millions of germs of highly-contagious diseases. The inhabitants have been warned all over the country against this new dissemination of 'kultur.'"

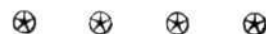


## LIGHTER THAN AIR.

IT is easy to understand why the Zeppelins have a partiality for almshouses. They think it's another name for munition works.—*Punch*.



TOUCHING a recent raid, the War Office says: "The casualties were confined entirely to the civil population." But the War Office must not count on their remaining civil if the Zepps. always get off scot free.—*Whipped Topics*.



## PUBLICATIONS RECEIVED.

*Hints to Pupils Who are Learning to Fly.* By J. L. Hall. London: The Hall Aviation School, Hendon Aerodrome.

*The Ruffy-Baumann School of Flying.* London: The Ruffy-Baumann School of Flying, Kendall's Mews, George Street, Portman Square, W.

If you require anything pertaining to aviation, study "FLIGHT'S" Index to Advertisers and "FLIGHT'S" Buyers' Guide and Trade Directory, which appear alternately in these pages—one each week.

[Owing to great pressure upon our columns, several regular features are crowded out.—ED.]

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